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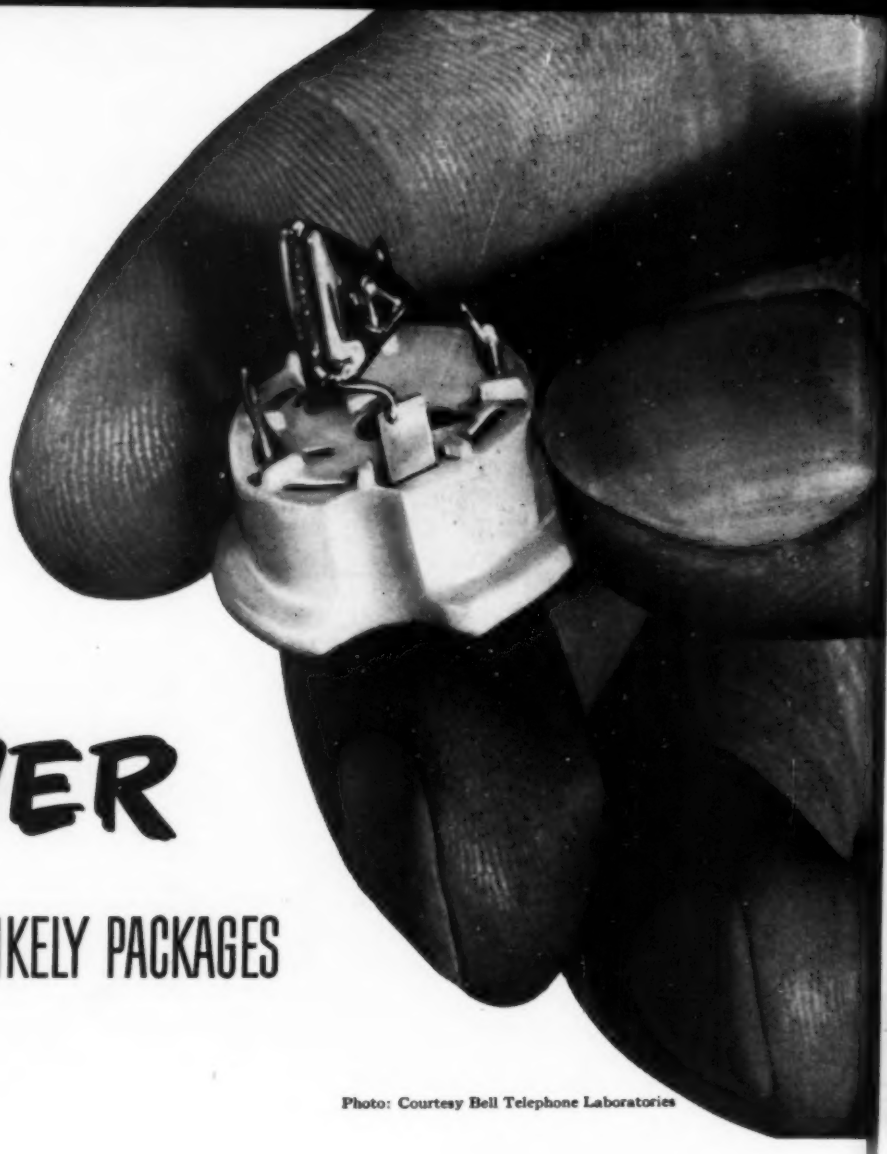
JANUARY, 1950 Vol. 39, No. 1

The Shop Teachers' Professional Magazine

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION ON FILM

Season's Greetings



POWER

OFTEN COMES IN UNLIKELY PACKAGES

Photo: Courtesy Bell Telephone Laboratories

It used to be thought that diamonds did not conduct electricity. But physicists of the Bell Telephone Laboratories bombarded diamond chips with millionth-of-a-second bursts of electrons and discovered that the chips then yielded up to 500 times the original current. This discovery may lead to new and better types of electron tubes for long-distance communication. Thus, *power often comes in unlikely packages.*

Unprepossessing youngsters, apparently qualified only for mediocrity, have often made outstanding records of achievement and success in later life. Yet this fact need surprise no man. For just as the diamond chips *possess* the power which the right agent was able to reveal, so *all* youngsters with but trivial exceptions possess all the qualities *they* need for success, needing only the right influences to bring them out.

Knowing the universal desire for prestige and achievement and the equally universal possession of energy, the conscientious educator looks for ways of showing the boys in his class the possibilities that lie ahead of them, the potentialities within themselves and the road to be followed. The need is as pressing. the opportunity is as great in the class in mechanical drawing.

Here, the work points directly at the adult years, the classroom foreshadows the engineering office. Above all, the work combines discipline of the hand and discipline of the mi Great opportunity is presented to enthuse and inspire the beg ning student, to awaken dormant ambition for high achie ment, to initiate habits which will serve him well. To say it d not matter what quality of drawing instruments the stud uses, to say his drawing set can be carelessly chosen and garded with indifference, is to make this work an ill-star venture. It is a risk no conscientious instructor will take. T only possible reason for accepting less than the best is an ec omy of pennies gained at who knows what cost in the futu

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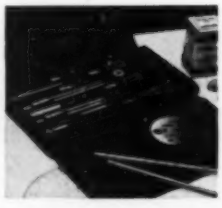
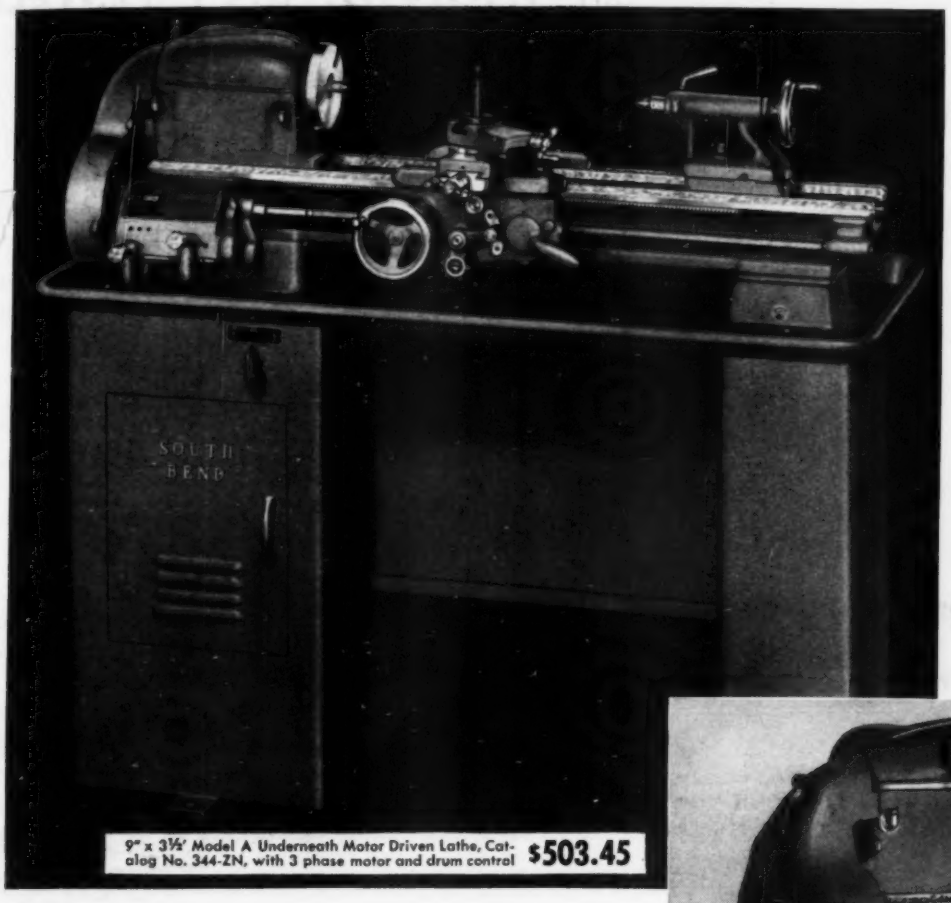


DIETZGE

EVERYTHING FOR DRAFTING AND SURVEYI

876
879

The Ideal Lathe *for School Shops*



9" x 3½' Model A Underneath Motor Driven Lathe, Catalog No. 344-ZN, with 3 phase motor and drum control **$503.45**

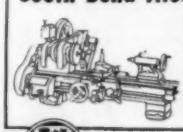
This 9-inch swing South Bend Precision Lathe is small enough for the Junior High School boy to handle with ease, yet it has ample capacity for most shop projects. Ruggedly constructed for industrial service, it will withstand the abuse of student operation. Neat and compact in design, it presents an excellent appearance in the shop, and is economical of floor space and power. A built-in chip pan catches shavings and prevents the shop floor from becoming littered.

All gears, belts, and pulleys are fully enclosed. The motor and driving mechanism are built into the cabinet base under the headstock. Neither the end gear guard nor the cone pulley cover can be opened until driving power is disconnected. This, and other safety features, make the lathe almost foolproof. See illustration at right.

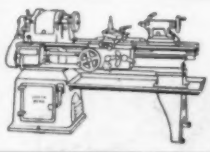
The price of this fine lathe complete with three-phase motor and drum control switch is only $503.45, f.o.b. South Bend. This low price enables you to provide more lathes — train more students on a limited budget.

B
A
C
This position of lever unlocks gear cover (A), headstock cover (B), and disengages motor drive (C) even if electric power is left on. Access is possible to gears (at A) or headstock belt drive (at B) only when these parts are not moving.
With lever in this position, the gear cover (A), and headstock cover (B) are locked in their closed positions, and the motor drive (C) is engaged.

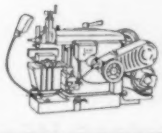
South Bend Also Makes:



Bench Lathes With 9" and 10" swings, 3' to 4-1/2' bed lengths, in 27 models.



Floor Lathes With 10" to 16/24" swings. Quick Change Gear and Toolroom models.



7" Bench Shaper 0 to 7" stroke, cutting speeds 3' to 114' per min. Six power cross-feeds.

14" Drill Presses Drill capacity 1/2" in steel. Floating spindle. Bench and floor models.

SOUTH BEND LATHE WORKS

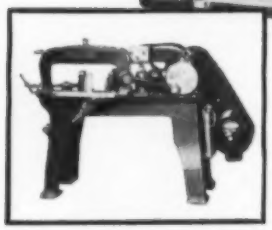
BUILDING BETTER TOOLS SINCE 1906 • 466 EAST MADISON STREET, SOUTH BEND 22, INDIANA

A RACINE "UTILITY"

MAKES METAL CUTTING SIMPLE and EASY

A 15 year old student can learn to efficiently operate a Racine "Utility" in less than 30 minutes.

RACINE "UTILITY"
Wet Cut Model



RACINE "UTILITY"
Dry Cut Model

Racine "Utilities" are used in today's large and small industries as an auxiliary saw for all-around metal cutting work. They are the ideal saws for training students between school and job.

Capacity 6" x 6", these saws will accurately cut any metal from soft aluminum tubing to hard alloy steels. Both the pressure and feed of the saw blade are controlled hydraulically. All moving parts are guarded to prevent accidents — most important in school training equipment.

"Utility" Wet Cut Model is provided with a base containing reservoir for coolant. "Utility" Dry Cut Model is the same as "wet cut" model in every detail except base consists of four sturdy iron legs.

Larger Racine Hydraulic Metal Cutting Saws in capacities of 6" x 6" to 20" x 20" are also available. WRITE for complete metal saw line catalog No. 70-C. Address RACINE TOOL & MACHINE CO., 1780 State St., Racine, Wisconsin.

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IMPROVED Spring Clamp
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Openings 1 in. to 14 in.

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All popular sizes

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Openings 4 in. to 5 ft.

No. 640 IMPROVED "I" Bar Clamp
Openings 2 ft. to 10 ft.

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CLAMPS

• Hargrave Clamps have been constantly improved with the aid of skilled mechanics to offer greater operating advantages and increased durability. Individually tested, they must be stronger, tougher and flaw-free. Made in openings from ¾ in. to 10 ft., from ½ in. to 16 in. deep.

WRITE FOR CATALOG showing the complete line of Hargrave Individually Tested Clamps, Chisels, Punches, Brace Wrenches, Star Drills, Washer Cutters, File Cleaners, etc.

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HARGRAVE
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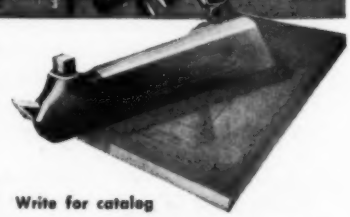
THE CINCINNATI TOOL COMPANY

ARMSTRONG

Every tool shown represents a full line of quality tools, known the world over as the finest of its type.

Armstrong Tools are stocked by Industrial Distributors.



Write for catalog

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
5222 W. Armstrong Ave., Chicago 30, U. S. A.
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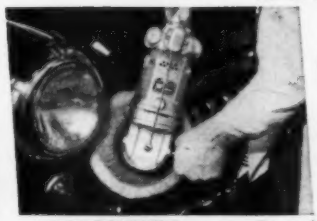
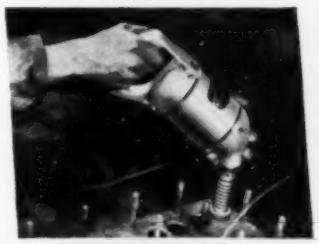
OVER 100 WAYS TO TRAIN STUDENTS

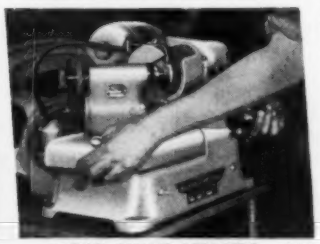
4 ***B&D SANDERS*** *each give you four uses—sanding, grinding, rubbing and wire brushing. New 7" Junior model (shown) is ideal for small shops!*



3 ***B&D POLISHERS*** *remove dirt and grime, polish and seal car surface in one operation. New Junior Polisher ideal for small shops. Team up with* ***B&D VACKAR**** *Vacuum Cleaners.*

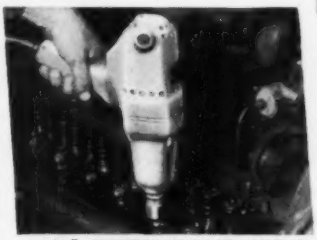


3 ***B&D VIBRO-CENTRIC**** *Valve Seat Grinders quickly put a mirror finish on valve seats to match refaced valves for tight-fitting assemblies.*



4 ***B&D VALVE REFACERS*** *quickly and accurately grind valve faces, stems and tappets in all cars, trucks, tractors.*

25 ***B&D SCREW DRIVERS*** *handle a wide range of screw driving and nut running, including motor tear-down and assembly.*



1 ***⅜" ELECTRIC IMPACT WRENCH*** *hammers loose the most stubborn, rusted fastening. Drives nuts, bolts, studs tight. ½" square drive shank.*

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Black & Decker Tools give you *BETTER RESULTS...*

Per STUDENT B&D Electric Tools are perfectly balanced, weight-saving, easy to control. Help students learn faster, with less fatigue and trouble. Train them to do accurate work on the same tools they'll use after graduation.

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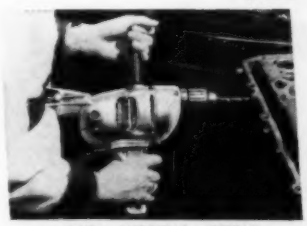
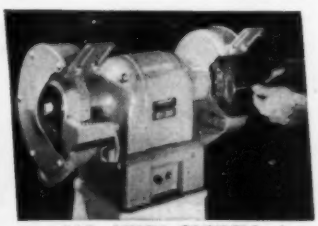


25 ***B&D ELECTRIC DRILLS*** *are available in capacities from ¼" to 1¼"—for all drilling, driving Hole Saws, carbon removing brushes, cylinder hones.*



4 ***B&D BENCH GRINDERS*** *clean valves and dirty, gummy parts; keep tools sharp; buff plated metal surfaces; grind metal.* ***4 PORTABLE GRINDERS,*** *3"-6" diam.*

In addition to the Tools pictured THE WORLD'S MOST COMPLETE LINE includes:

15 Valve Seat Grinding Kits • 3 Electric Shears
1 Valve & Tool Grinder • 5 Drill Stands
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These typical quality features insure long life, continued accuracy, and low maintenance costs!

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Perfectly round, true to size, correctly positioned, properly aligned. Bearings fit closely, are tightly held, cannot become loose.

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An extra manufacturing operation removes "end play." This provides maximum rigidity and accuracy under load and increases bearing life.

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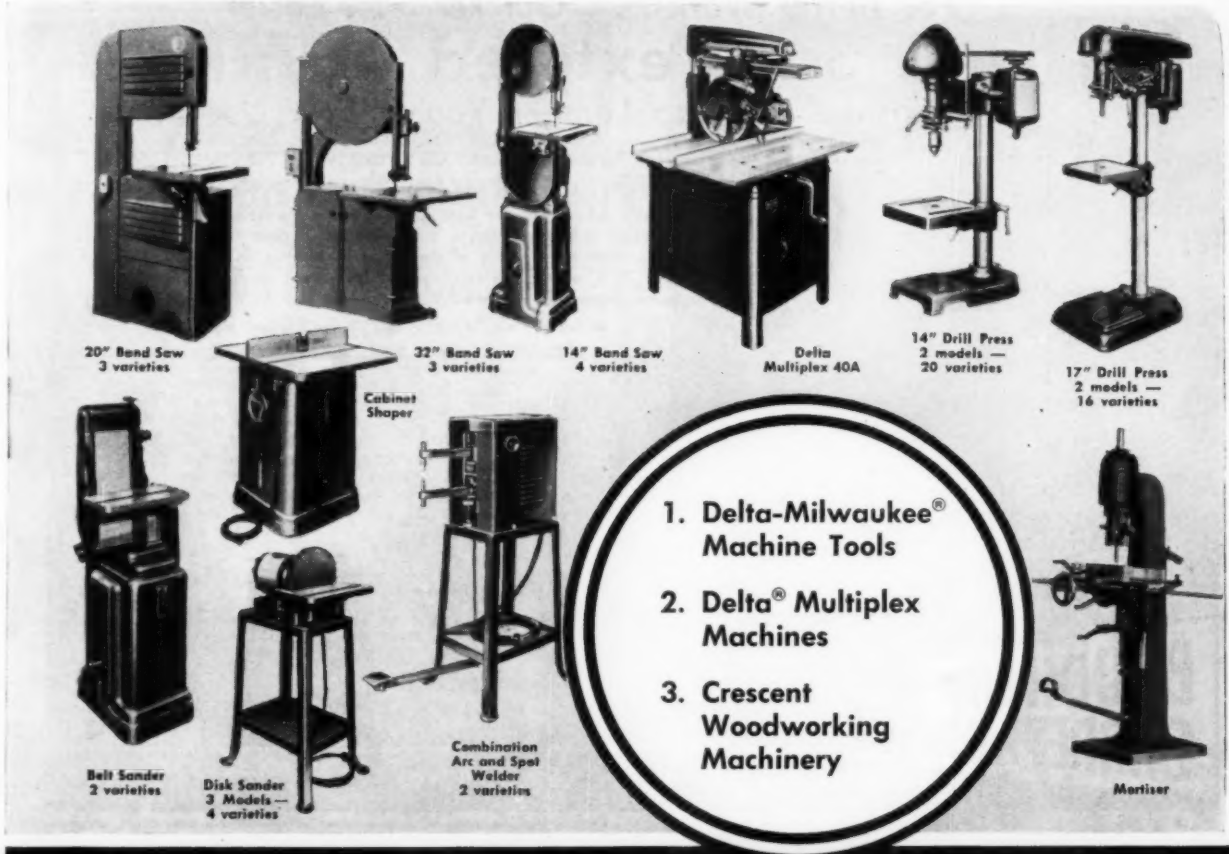
All spindles, arbors, and collars are ground for accuracy, to provide full, even contact between shaft and bearing — and assure accuracy.

Dynamically-balanced Pulleys

Pulleys which transmit the power from motor to machine are dynamically balanced to help eliminate damaging vibration.



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Safe! Right for size! Easy to run! Economical!

It's easier to get your requisition approved, when you specify a Delta machine. You choose the one that *exactly fits your program and budget* from the most complete line available—the only line with complete accessories for every tool. And you are sure *your* students are well equipped to take their jobs in industry when they graduate; practically every branch of industry uses Delta quality tools.

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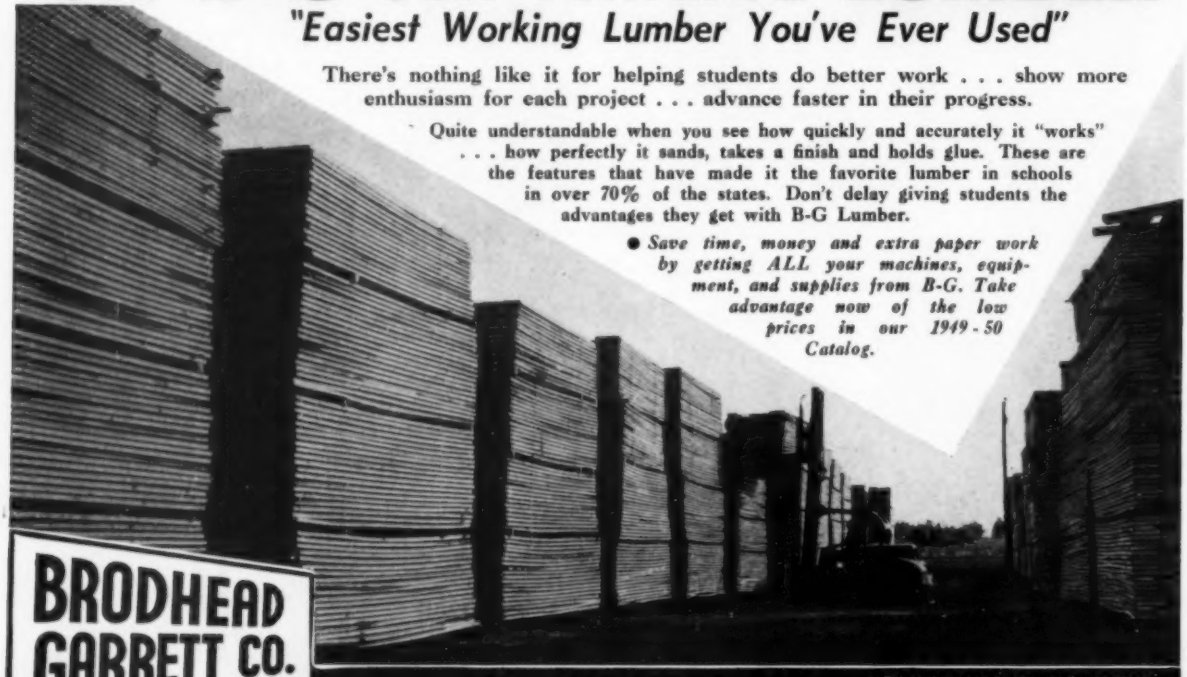

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Hand-I-Hack is very rugged and simple to understand and use. It will work in any position, and will handle practically every job encountered in a school shop. Capacity 3" x 3". Uses low-cost 10" hand blades which last 3 to 5 times longer.

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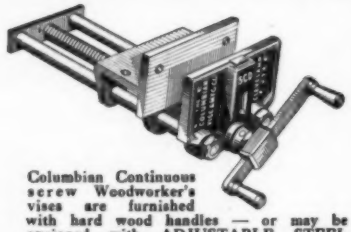

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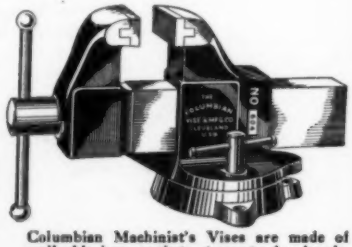

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Specify * WALLACE
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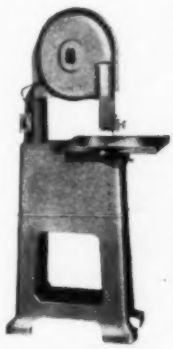
For Faster, Easier Bandsawing . . . Greatest Economy.



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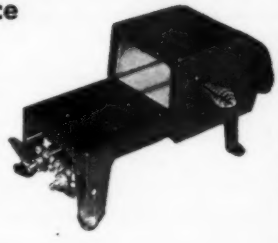
Delivers up to 1800° F. without a blower. The most efficient, powerful and economical bench furnace made for heating soldering coppers up to 12 lbs. per pair. Also used for heat treating, case hardening, and annealing carbon steels. Two burners. Firebox 3¾ x 4½ x 5½. Complete with work rest block and baffle plate.



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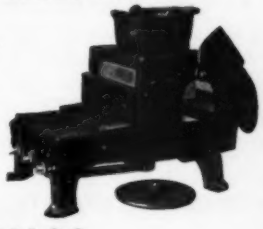
Use this furnace for heating largest soldering coppers, stenciling irons, branding irons, etc. Also for heat treating carbon steels. Lid on hood may be removed and 22 lb. melting pot inserted for melting soft metals such as lead, tin, zinc, babbitt, etc. Two burners. Firebox 6¼ x 5 x 6½. Complete with pot as illustrated.



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There's an ATKINS for Every Classroom Use... You Just Cannot Get Finer Saw Steel than ATKINS "Silver Steel"

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Hacksaw Frames and Blades

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WASSAMATTER... G.P. MEANS GENERAL PURPOSE, DON'T IT?
G.P. ALSO MEANS GOOFY PEOPLE WHEN THEY USE FILES F'R HAMMERS!
I SUSPECT Y'RE TALKIN' 'BOUT GREASY PANTS—THE MAN GRIM POP LOVES!
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VOL. 39, NO. 1 JANUARY, 1950

Industrial Arts and Vocational Education

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Our New Home

400 NORTH BROADWAY
Milwaukee, Wisconsin

Moving into our new business home is now in process. Located a short distance from our present address, we expect the moving job to be completed by the end of January, 1950.

The functionally designed interior of The Bruce Building provides adequate facilities for the publication of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine and all the other Bruce publishing enterprises.

In announcing the completion of our new home, we express our grateful appreciation for the recognition and support which has come to us over the many years since our business was established and has made this accomplishment necessary and possible.

Season's Greetings

The January issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION will reach you shortly before Christmas. It is, therefore, with great pleasure, that we voice once again, the age-old greeting — a Joyous Christmas, a Very Happy New Year, to every industrial arts and vocational education teacher in the world.

This Month's Cover

The photograph chosen for the January, 1950, cover of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION was submitted by Harry A. Goldstein, teacher of photography. It shows a student working at the lathe in the general metal shop at the Tucson Senior High School, Tucson, Ariz.

Coming Conventions

Dec. 26–31. Annual Science Exposition of the American Association for the Advancement of Science, at New York City. Headquarters, Statler Hotel. Convention chairman, Dr. R. L. Taylor, 1515 Massachusetts Ave. N.W., Washington, D. C.

Dec. 27–31. National Science Teachers Association, at New York City. Headquarters, Hotel New Yorker. Executive secretary, Robert H. Carleton, 1201 Sixteenth St. N.W., Washington, D. C.

Jan. 13–14. Audio-Visual Education Association of California, at San Francisco, Calif. President, Gardner Hart, Oakland Public Schools, Administration Bldg., 1025 Second Ave., Oakland, Calif.

Jan. 23–27. Southwest Air Conditioning Expositoin, at Dallas, Tex. Headquarters, State Fair Park, Hall of Agriculture and Poultry Building. President, Charles F. Roth, c/o International Exposition Co., Grand Central Palace, New York City.

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INSTRUCTORS AND STUDENTS ENTHUSIASTIC OVER NEW PROJECT

Best Efforts Are Sparked by Enlisting Related Interests

Desire to Build Best Possible for Favorite Sport Creates Incentive

New Hartford, N.Y., Jan. 1 (NTI)*— Scores of letters from Industrial Arts Instructors attest to the fact that the building of something genuinely desired for use by the student is an invaluable incentive to careful workmanship and concentration.

"My students are very proud of the rods they have built" is a commonly expressed reaction among instructors of apprentices of all ages. Boys are frequently quoted to have boasted. "My bamboo rod is better than Dad's." Or, from another, "To a remarkable degree it promotes enthusiasm and respect for good workmanship."

Variety Rod Types Offered

Standard rod-building kits offered by the Empire Tackle Company include fresh water fly, bait and pin casting rods and salt water weakfish, surf and trolling rods. Special kits can usually be made up for tackle peculiar to certain areas.

BAMBOO ROD BUILDING LAUDED AS AID TO INDUSTRIAL ARTS TRAINING

Instructors Cheer the Fully Illustrated Step-by-Step Self-Instructing Directions

New Hartford, N.Y., Jan. 1 (NTI)*—The recently announced split-bamboo rod building kits adaptable for junior high through adult training classes are meeting with an enthusiastic nationwide acceptance. Graphically prepared, step-by-step instructions and highest quality materials combined with widespread participation in angling are said to account for the speedy growth.

Includes Advanced Supplementary Instructions

Each kit includes completely illustrated instructions for that particular type of rod. In addition, and for the instructor who is inclined to carry the project to its ultimate, advanced rod building information is covered in what is perhaps the most complete monograph on the subject. Among other subjects covered are the theories of parabolic action, guide spacing and tapers, rod straightening, special finishing, grip forming, history of fishing and of bamboo rod building.

Only Simple Hand Operations Required

Although instructions are provided for use of a lathe, nothing more than a file, scraper and sandpaper are necessary to build a first quality rod from the Empire Tackle Company kits. The student operations include scraping, sanding, fitting, measuring, aligning, guide locating and winding, varnishing and assembling.

Completely Illustrated Instructions

Generally prevailing overcrowded classes, resulting in limited time for individual guidance, makes graphically presented directions a boon to instructors. Step-by-step, from an introduction to nomenclature through varnishing the completed rod, is illustrated by close-up drawings. So simply and completely are the steps detailed that any 12-year old with reasonable aptitude can make a rod of commercial quality without any additional help.

Priced Especially for Schools

Empire Tackle Company offer their rod building kits at a school price of one-half the regular retail price and a fraction of what equal quality component parts would cost if purchased seperately. The split-bamboo sections and every piece of hardware are of the finest quality obtainable and only careful workmanship is required to build a rod which would retail from five to ten times the cost of the kit.

* News to Instructors.

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JANUARY . . 1950

The Quest for Life-Adjustment Education

R. LEE HORNBAKE
Professor of Industrial Education
University of Maryland
College Park, Md.

The unlettered and nondegreed "primitive" educator has had no difficulty in providing his children and youth with life-adjustment education. By simple and direct means he has met the intellectual, social, political, economic, and moral needs of his way of life, and all the youth "complete" the "program."

The modern lettered and degreed educator has had no difficulty in providing his youth with an untimely and artificial education which has led to frustration and inefficiency. Frustration and inefficiency are verified in part by the simple statistical fact that approximately one youth in two does not continue through the secondary school. And this condition prevails in a nation in which there is no higher court of appeal than the wisdom and knowledge of the masses.

Now a group of educators[1] which does not carry a banner of radicalism has been willing to subscribe to the statement that we need a secondary education which makes for life adjustment. They say "our high schools don't make sense for 60 per cent of our kids." Apparently the timing of this proclamation was opportune. Whereas the same thing has been said hundreds of times before without much notice, this time the statement has resulted in the appointment of a national commission, the holding of regional meetings, the production of monographs, the issuance of oratory, the appearance of life-adjustment experts, the development of major areas of life adjustment, and some new educational terminology.

The work of the National Commission on Life Adjustment Education for Youth may result in educational programs which reach more youth and which serve both the youth and society in a superior manner. Again, it may not. The first sorties of this crusade look much like a large scale curriculum campaign with the same strategy as has been used in countless other curriculum ventures.

But what has developed from the many preceding curriculum campaigns? Back in 1927 the National Society for the Study of Education reported "that more than one thousand school systems in the United States are continuously engaged in the task of curriculum-revision is a conservative estimate." Norton and Norton, reporting in *The Foundations of Curriculum Building* in 1936, said that: "in the decades between 1915 and 1935 not less than 35,000 courses of study were issued." Certainly the curriculum revision pace has not slackened significantly, if at all, and much of it follows the pattern of minor change.

Where Have We Been?

The existence of similarities between the initial statements of the National Commission on Life Adjustment Education and the work of earlier committees, commissions, and associations suggests that some thought be given to these prior efforts. The Commission has assumed "its major responsibility is that of translating into action recommendations contained in reports which other commisions or committees have made." This paper is in no sense a negative, discrediting survey but rather a humble effort to anticipate some of the hazards which inhere in the situation.

The National Commission on Life Adjustment Education has identified types of educational services and areas of development which merit special consideration. Seven of them are: (1) Ethical and moral living, (2) Citizenship, (3) Home and family life, (4) Self-realization and use of leisure, (5) Health and safety, (6) Consumer education, and (7) Tools of learning.

It does not take the mind of a super sleuth to observe a parallel between the foregoing list and the "Cardinal Principles of Secondary Education" which were enumerated in 1918 by the Commission on the Reorganization of Secondary Education. Practically every educator has memorized the cardinal principles: (1) health, (2) command of fundamental processes, (3) worthy home membership, (4) vocation, (5) citizenship, (6) worthy use of leisure, and (7) ethical character.

The 1918 Commission was thinking and speaking of areas of human activity, too, and of the cultivation of personal and social interests. The Commission opened the 1918 report with this modern-sounding hypothesis: "Secondary education should be determined by the needs of the society to be served, the character of the individuals to be educated, and the knowledge of educational theory and practice available." Later, in the same report, a plea was made for expanding the scope and emphasis of the high school program. The 1918 Commission wrote: "Secondary education in the past has met the needs of only a few groups. . . . Only through attention to the needs of various groups of individuals as shown by aptitudes, abilities, and aspirations can the secondary school secure from each pupil his best efforts. The school must capitalize the dominant interest that each boy and girl has at the time and direct that interest as wisely as possible."

The Commission of 1918 was observant also of the inappropriateness of the con-

[1]Reference is made to those who proposed and subscribed to the "Prosser Resolution." Out of this came the development of the National Commission on Life Adjustment Education for Youth.

tent and method of the several subject areas. The report reads: "Each subject now taught in high schools is in need of extensive reorganization in order that it may contribute more effectively to the objectives outlined herein, and the place of that subject in secondary education should depend upon the value of such contribution."

The major take-off points of these two Commissions, separated by thirty years of time, are substantially the same. The present-day Commission is confronted with the same risks of not realizing its ambitions and goals as was its predecessor.

It is worth while to note in passing that by 1918 the junior high school movement was well under way. Certain distinctive purposes were ascribed to the junior high school by a strong proponent, Thomas H. Briggs. Three of five of the junior high purposes, cited by Briggs, have a current pertinence:

2. To ascertain and reasonably to satisfy pupils' important immediate and assured future needs.

3. To explore by means of materials in itself worth while, the interests, aptitudes, and capacities of pupils.

5. To start each pupil on a career which, as a result of exploratory courses, he, his parents, and the school are convinced is most likely to be of profit to him and to the state.

By 1927 the leading curriculum spokesmen of the day (Bagley, Bobbitt, Bonser, Charters, Counts, Courtis, Horn, Judd, Kelly, Kilpatrick, Rugg, and Works) had concurred in preparing the Twenty-sixth Yearbook of the National Society for the Study of Education. These experts agreed that the public school curriculum should be based upon the nature and needs of the learner and upon the nature and needs of American society. The principles of curriculum development which were enumerated were said to apply equally well to elementary, secondary, and higher education. Some of their contentions are now being repeated. A Yearbook (1927) statement reads: "The curriculum can prepare for effective participation in social life by providing a present life of experience which increasingly identifies the child with the aims and activities derived from analysis of social life as a whole." And elsewhere: "Rarely . . . have the child, American Civilization, and the school been considered together."

Curriculum development, in the 1935–40 period, was dominated by the "major social functions" or "areas of human activity" approach. Caswell and Campbell, authors of *Curriculum Development,* were leading representatives of the idea. They said: "This procedure [defining the scope of the curriculum by social functions] is based on the assumption that the activities of children in schools should be organized in such a way as to carry over with greatest ease to real life situations." An embodiment of this plan is the Virginia curriculum statement. The Virginia curriculum cites the following as the major social functions to be considered in grades 9, 10, and 11 respectively: Agrarianism and Industrialism and Their Effects Upon Our Living; Effects of Changing Cultural and Changing Social Institutions Upon Our Living; Effects of a Continuously Planning Social Order Upon Our Living.

Many other commissions and individuals could be numbered among those who have expended time and energy on the curriculum of the secondary school. They have been sincere in their efforts to make school offerings compatible with the needs of the individuals who attend as well as more inviting to those 4 in 10 who do not enter high school and, compatible also with the needs of American society.

Because of this curriculum complex it will not be difficult for the National Commission on Life Adjustment Education for Youth to obtain the expressed co-operation of many schools and school people. Some modifications will be made in school programs. More conferences will be held and the speakers who appear on the programs will testify as to the changes they have made. The speakers who are close to home will describe minor changes. The speakers who are far from home will describe drastic changes. The difference in degree of change will be in direct proportion to the square of the distance the speakers are from home.

This will be true as long as curriculum reorganization constitutes the primary orientation of the Commission's efforts. That this is the point of view of the Commission may be inferred from a statement which appears in one of their 1949 publications: "The Commission on Life Adjustment Education for Youth is concerned with stimulating programs which more adequately meet the needs of pupils now in school. Even more, it is concerned with the type of education needed by the adolescent youth who drop out of school because their needs are not being met realistically."

Where Do We Go From Here?

The history of education, to be worth the effort involved in its study, should shed some light on the path ahead. Interpretations of history involve personal bias, but it seems reasonable that great results are not to be expected from further curriculum-centered ventures no matter how grandiose the plans. If educational effort were to be rewarded, the curriculum investments should have paid dividends long ago. Fault does not lie in poor intentions or in lack of industry on the part of those who have prepared the thousands of curriculum statements which fill library shelves and which occupy remote places in the file drawers of teachers. Nor is it implied that curriculum is a matter of slight importance. The major problem has been, and is, to place curriculum in a proper perspective; to locate it within an educational planetary system where curriculum development is not the shining light.

There are many reasons why curriculum sweat has not produced results commensurate with the efforts expended. Some of these reasons are administrative — in governmental circles it would be said the plans have not been implemented. Other reasons are conceptual; that is, the basic assumptions have not been in focus. The latter are by far the more important and two questionable postulates are discussed.

The first conceptual shortcoming is the postulate that in the event of educational ill-adjustment a significant improvement can be effected by attacking the problem from *one* side or by pursuing *one* course of action. In this instance an unsatisfactory curriculum is regarded as a cause for pupils not remaining in, or succeeding in, school. This line of reasoning is an expression of a sentiment which favors simple causal explanations of conditions. As a result equally important considerations are neglected. Only the most naïve layman gives ear to those who will eliminate sin by having people go to church, to those who will prevent future depressions by legislating large old-age pensions, to those who will preserve democracy by ignoring the existence of competing philosophies, to those who will preclude future wars by developing better atomic bombs. Such proposals are categorically rejected because of their singleness of approach to complex problems. Yet curriculum activity, as it has prevailed, has assumed the role of "cure-all" and its patent medicine characteristics have rarely been questioned by educators.

Education is a complex social institution serving heterogeneous peoples and numerous social ends. Education is one of many social institutions which are mutually dependent, with the problems of one affecting the well-being of the others. The school curriculum is in turn one small part of this social configuration. To assume that a manipulation of one element will make for far-reaching improvements is to misunderstand the equilibrium which our society possesses. Anyone who has been involved in introducing marked curriculum

change, without first making other adjustments within the larger society than the school, can probably document this statement by recounting the reactionary movements which neutralized the school efforts. The upshot is not that educational change is confronted with an impasse. The principle is simply that multiple approaches are necessary if educational improvement is to be effected, and the curriculum campaigns to date have been unilateral and channeled.

The second conceptual postulate which merits appraisal is somewhat more subtle. While much of the recent curriculum activity — say that dating from 1930 — has alleged to provide an education more compatible with individual and social "needs," it has missed the mark by assuming that education is a process of providing curriculum-to-student relationships and curriculum-to-society relationships. Hence, student and society are made compatible with one another via curriculum. This procedure seems to contradict common sense inasmuch as education is of *people*, by *people*, and for *people*. ***Education is human relations par excellence.*** Curriculum activity obscures the fact that *life-adjustment education* has been impeded by a lack of high quality relationships existing between pupils and teachers, between parents and teachers, between teachers and administrators, between teachers and community, between real estate groups and school officers, between principals and superintendents — the list can be extended by anyone who takes a few minutes to do so.

The educational profession has been so engrossed in glorifying pious objectives and in shuffling content that it has conducted relatively few studies where the quality of human relations has occupied the center of attention. In fact, it is outside the field of formal education that the fundamental importance of human interaction is brought to the fore.

As a case in point a five-year experiment in human relations is reported in *Management and the Worker*.[2] A careful perusal of this report will likely yield more suggestions pertinent to life-adjustment education than will a nationwide quest for a new curriculum.

No analogy is suggested between the economic ends of business and purposes peculiar to education. But business *management*, like education, deals primarily with people and their spokesmen have come to accept this condition. Management gets things done through people and it has the same human motivation problems as education — the economic factor notwithstanding. The reason for mentioning business management is the fact that there is within management literature a small but respectable body of *experimental* evidence on human relations to which we can turn for suggestion. It is in management literature also that such phrases as the following become more and more prevalent: "job satisfaction," "the employee's sentiment of individual integrity," "identifying a task with socially meaningful function," "disturbance of social equilibrium," "keeping the lines of communication open." Education needs to employ the positive conditions connoted by these and similar principles as means to ends and as ends as well. The secondary school should prepare people to develop ways and means of seeking these conditions for themselves — and that is the essence of life adjustment.

Educators have not been completely neglectful of studies in human relations. As an example, Fults[3] reports on a study with the title "Improving Learning Through an Emphasis on Human Relations." According to the study "the experiment was to see what happened within a group and to individuals who had learning difficulties when the teacher's major emphasis was given to furthering good human relations. . . . The general conclusion drawn from the total experiment was: a direct attack upon the problem of improving learning through an in-service teacher education program, which emphasized human relations within the total group, tended to result in significant increases in social acceptance, reading skills, and intelligence as measured by a psychological test."[4]

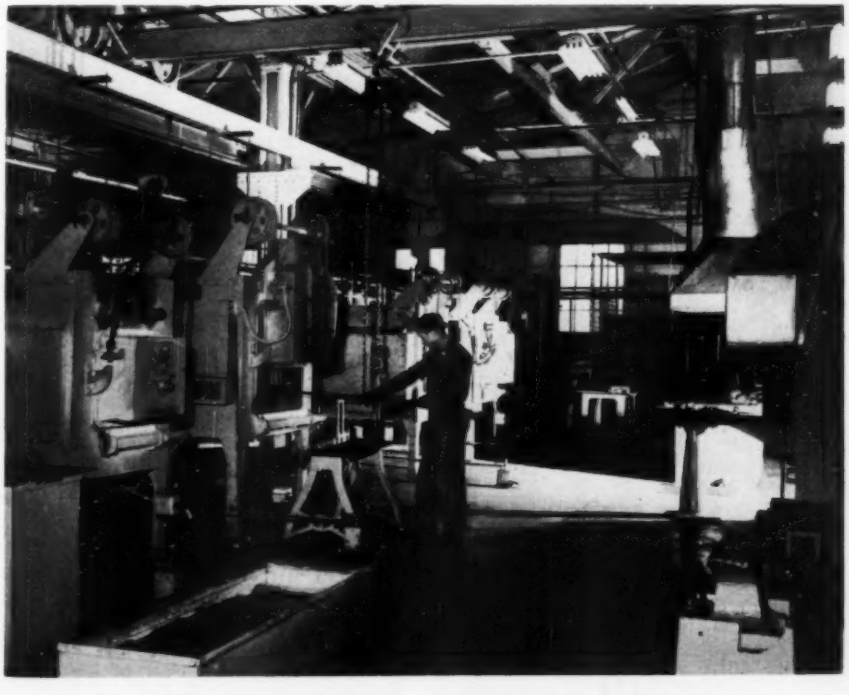
To summarize, curriculum enterprise, as it has been conceived and executed, promises little in the way of curing the illnesses which have been ascribed to secondary education. Curriculum reorganization has been a single-sided attack to a multi-sided problem. It has compartmentalized education and has stereotyped thinking. Curriculum activity per se has lost its intrinsic power because of its excessive use. It has neglected to regard the school as a social unit operating within a larger social organism. It has been misleading because the fundamental importance of human relations is sidetracked for inanimate subject matter and vague purposes.

The problems of living and hence the problems of life-adjustment education are essentially human relations in nature. This condition should shift the emphasis from curriculum statements to human motivations.

[2] F. J. Roethlisberger and W. J. Dickson. *Management and the Worker*. Cambridge: Harvard University Press, 1949, 615 pp. See also: Henry C. Metcalfe and L. Urwicks (eds.). *Dynami Administration: The Collected Papers of Mary Parker Follett*. New York: Harper and Brothers Publishers, 1940, 320 pp.

[3] Anna Carol Fults, "Improving Learning Through an Emphasis on Human Relations," *Childhood Education*, 24:7 pp. 305-307, March, 1948.

[4] *Ibid.*, p. 307.



New heat-treating equipment in the head and knife department of the Yates-American Machine Co., Beloit, Wis.

Instructor Training in the Navy

HOMER C. ROSE
Head, Curriculum and Instructor Training Section
Training, Bureau of Naval Personnel
Navy Department
Washington 25, D. C.

The navy's instructor training program is designed to train individuals in the practical techniques of instruction.

Frequently, when we think of instructing or teaching, we imagine someone standing in front of a group of students, lecturing to them on some subject of more or less use to them. Actually, teaching in the navy ranges from classroom instruction on fundamentals through practical experience, to on-the-job training of teams and crews who man the ships.

The job of instructing is one the officer in the navy never outgrows; for as long as he holds a position of leadership, carries responsibilities for personnel, or deals with people, he must instruct and train others. He may pass on to broader fields than those concerned with gunnery or seamanship or navigation, but he never outgrows the job of training others to assist in solving the navy's problems.

The navy considers instructor training for enlisted men so important that the development of knowledges and skills in teaching and training procedures has been made a part of the requirement for promotion.

Actually, principles stressed in instructor training programs are closely related to the principles of leadership as all good teachers must be leaders, and all good leaders must be teachers. This concept is supported further when considering the content of the several new publications on the subject of leadership. These publications include discussions on how we learn, human relations, motivation, and the responsibility of leaders in instructing others.

The general objective of the navy instructor training program is to improve the quality of instruction throughout the navy. This is being accomplished by developing in naval personnel desirable attitudes, knowledge, and skills related to the job of instructing.

War, with its resulting pressure to improve efficiency in all areas of human endeavor, had its effect on the procedures used for training instructors. During the early phases of the war it became quite apparent that with the large number of people undergoing training, some system would have to be developed for providing capable instructors in large numbers. In the navy, these instructors had to be drawn from the rank and file of military personnel, of whom only a few had had teaching experience in civilian life.

The Development of Instructor Training Programs During World War II

One of the early and most significant instructor training programs was located at Fort Knox, Ky., headquarters of the Armored Force Command. This army instructor training program began in 1941 and the job of training instructors for the armored schools was assigned to Colonel Verne C. Fryklund, now president of Stout Institute. His staff consisted of civilian training specialists from various colleges, high schools, vocational schools, and industrial training programs. This pioneering instructor training program had a strong effect in the development of other units of a similar nature in the armed forces.

Early in 1943 the navy launched its instructor training program. The need for constant instructor training was critical.

Of the 5108 instructors located at 166 navy training activities in 1944, very few had previous teaching experience. Many of the men assigned to teach were experts in their fields, but some of them were poor lecturers, were unable to handle class discussions effectively, knew little or nothing about training aids, were unaware of the newer developments in shop training practices, and were unacquainted with lesson planning and testing techniques.

The first steps toward a navy instructor training program were taken in July, 1943, when an instructor training officer was ordered to Bainbridge, Md., for duty at the Service School Command. This officer's mission was to build up shops and laboratories and to improve instruction in every way possible. In August he was joined by five additional instructor training officers who were later sent as instructor training officers to Great Lakes, San Diego, Farragut, and Sampson. This team of officers immediately set to work in cooperation with the instructors at Bainbridge to put the curricula, prepared by the Curriculum Unit at the Bureau of Navy Personnel, into effective use. Their problems were many and perplexing. In the first place there was a crucial shortage of training equipment, resulting from the fact that virtually all the equipment needed for instructional purposes was on the critical list and needed for installations aboard ships. The second problem was to develop textbooks, training aids, job sheets, lesson plans, and tests for practical use with the available facilities. A third, and perhaps the major problem was to prove to the navy that time spent in training instructors was time well spent.

By the end of the initial six weeks' period the progress made at Bainbridge was sufficiently encouraging to impress the most skeptical that the instructor training program had a real mission to fulfill, and Bainbridge was on its way to becoming a demonstration center which would serve as a pattern for navy schools throughout the country. Moreover, the instructor training officers had acquired valuable firsthand experience in working with navy personnel and in handling instructional problems in navy training centers. These men, and those who followed them, were thus equipped to assume posts at each of the other naval training centers where they established instructor training programs and proceeded to apply the lessons they had learned at Bainbridge.

In September, 1943, the Instructor Training Unit was created as a permanent part of the Standards and Curriculum Division, Bureau of Naval Personnel. The Unit's main responsibility was to assist naval instructors to:

1. Orient themselves on the job of instructing.
2. Interpret standard curricula in terms of available equipment and other local conditions and to help put these curricula into operation.
3. Develop effective teaching methods appropriate to the subject being taught.
4. Obtain the fullest utilization of available equipment.
5. Develop shops and laboratories and organize appropriate work stations, in order that trainees might perform practical jobs under instruction.
6. Prepare instruction sheets to guide trainees in the performance of practical jobs.

Fig. 1. Lt. (jg) H. C. Rose (center) and school officers discuss lesson planning in amphibious training command in 1944

Fig. 2. A practice lesson by one of the students in an instructor training class at U. S. Naval School, Instructors, Norfolk, Va.

7. Prepare instructional materials such as course outlines and lesson plans to improve instruction.

8. Develop appropriate tests for measuring the learning of students and the effects of instruction.

9. Prepare manuals for navy instructors on how to teach.

As the effectiveness of the early instructor training programs became more apparent, and as more of the instructor training officers became available, the services of the program were expanded into practically every type of navy training. For example, the Amphibious Training Command on the Atlantic Coast had a staff of instructor trainers at each of four training centers. In addition to their work as instructor trainers, these officers organized and implemented the development of curricula, training aids, and tests. They associated closely with training officers and provided assistance in planning for over-all amphibious training.

At the close of the war in 1945, three major instructor training schools were in operation. Each district director of training had an instructor training officer on his staff, instructor trainers were operating in shipboard training programs, and many special types of instructor training had been established.

Much credit is due Captain John A. Bartky, now dean of the School of Education at Stanford University, and his associates in the Bureau of Naval Personnel for the pioneering work in navy instructor training.

During the reorganization phases following the war, no instructor training schools were provided and the instructor training officers, 100 per cent of the number being civilian educators, were demobilized. The Instructor Training Unit in the Bureau of Naval Personnel was, however, retained and staffed with civilians who had served as instructor training officers during the war.

The war had a definite impact on education and training. There was no time for leisurely training methods in preparing millions of our young men and women to take their places in a complex fighting machine.

It is an interesting fact that, while the development of the instructor training programs in the armed forces was guided by professional educators, these programs were so successful that they have implications for the civilian training of instructors today. This came about because educators with broad backgrounds of experience in education rose to the challenge presented by wartime conditions to streamline and put into practice the best instructor training practices.

Since the war, various training techniques developed in the armed forces during the war have been studied by civilian educational organizations.

The New Instructor Training Schools

During the demobilization period the demand for personnel afloat was so acute it was considered necessary to reduce drastically the personnel in schools ashore. This resulted in the elimination of a significant amount of material from school curricula, the shortening of school schedules, and the decommissioning of the instructor training schools.

During the two years from 1946 through 1948, it became increasingly evident that the quality of instruction in navy schools could not be maintained without the special training of instructors. Consequently, in January of 1949, two instructor training schools were re-established. These schools are located in San Diego, Calif., and Norfolk, Va. A description of the four courses offered in these schools follows:

Service School Courses: The major course from the standpoint of number of students is that provided for officers and enlisted men on their way from sea duty to duty as instructors ashore in the schools. The plan is to send through this four-week course all enlisted men and as many officers as possible, prior to their reporting for duty as instructors. A further mission of the school and this course is to identify these individuals who because of attitude or ability, appear to be unqualified for instructional assignments. Such personnel are sent to other more appropriate duty.

The curriculum for this instructor training course includes the following: (1) Factors affecting learning. (2) How to study. (3) Planning instruction. (4) Instructional and job analysis. (5) Training aids. (6) Methods of instruction. (7) Shop planning and management. (8) Scheduling techniques. (9) Utilization of instruction sheets. (10) Testing techniques. (11) Techniques of evaluating or measuring the quality of instruction.

The course is designed to provide maximum opportunity for the application of those things studied in the course. For example, students not only discuss how training aids should be used, but also make plans for the construction of training aids for specific purposes, practice ordering training aids available through the district, and describe to the class how specific training aids should be used in specific lessons. Each student taking the course has several opportunities to give practice lessons which are in turn evaluated and discussed by other members of the group. Theoretical discussions not leading to practical application of teaching techniques in navy schools are avoided. This course provides instructor training for all the service schools and the recruit training commands.

The NROTC Course: Twice each year — in January and July — a special four-

week course is conducted for the enlisted men assigned to the professors of naval science in the NROTC units located in 52 universities and colleges throughout the country. This course, while similar to that offered for service school and recruit training personnel, is supplemented by instruction on such topics as the organization and operation of the NROTC program, factors to be considered in living and working on a college campus, and correct relationships with college personnel. In this course, also, one objective is to recommend only those who appear to have the desirable characteristics for specific instructor assignment.

The Naval Reserve Course: Each of the instructor training schools provides a naval reserve instructor training course of two weeks' duration. The purpose of this course is to provide within the 14 days' time allowed for annual training duty, a practical but intensive course for personnel working with the Naval Reserve Training Program. This course is similar to the service school course except that it is condensed to two weeks' duration and emphasizes the special problems encountered in naval reserve training. Not all of the naval reserve instructors can attend this course, and it is contemplated that this training will be supplemented by instructor training courses conducted in the individual naval district headquarters and Naval Reserve Training Centers. Graduates of the instructor training school will become key personnel in the locally conducted instructor training courses.

Shipboard Training Course: A fourth course is designed for personnel assigned to operating ships. This course, while based on the same principles of learning and teaching, emphasizes on-the-job or in-service training of personnel and the organization of practical shipboard training programs. The type of teaching found most useful aboard ship is a far cry from that of the classroom. Very few situations will lend themselves to the techniques of instruction that are normally thought of when training or teaching is mentioned. There is a vast difference between the quiet surroundings of a shore-based school where the trainee is taught the basic knowledge and skill, and the noisy, crowded, busy atmosphere of an engine room where the striker must be taught to work as a member of a team.

Limiting factors such as these necessitate the use of a type of instruction known as on-the-job instruction. In a typical training situation aboard ship the petty officer instructs and supervises one man or a team of men while they are on the job. In most cases, the instruction takes place more often while the men are working with the actual equipment, or, if costly or unavailable materials are involved, with suitable mock-ups or other training aids.

Instructor Training School Staffs: Personnel to conduct the courses and to administer the instructor training school have been very carefully selected. The school is administered by a lieutenant commander who has one officer assistant. Three well-qualified civilian educational specialists are employed in each school to give continuity to the program and to provide expert educational guidance.

These schools are too new to be judged. However, there can be little doubt that their work will reflect general improvement of instruction throughout the navy training program and improvement in the quality of personnel reporting to the fleet from the shore schools.

In-Service Training of Instructors: After the individual has received training in the fundamentals of teaching and has been assigned as an instructor he enters the second phase of his training. We cannot assume that because a man has gone to school and developed certain basic skills and attitudes that he will be able to transfer these to a specific teaching situation. Follow-up is essential. It is the responsibility of the officer in charge of the school and all personnel having supervisory responsibilities to give further in-service training to the instructors upon their arrival and during their tours of duty as instructors. This usually consists of assigning the new instructor to observe one of the more skilled and experienced instructors in the type of work in which he is to instruct. Following this, a new instructor is given a light teaching load if possible, and is observed and guided by a supervisor who has a sound knowledge of the subject and practical teaching experience in the specific subject. It should be emphasized that a supervisor, to be effective, must know his subject, be a skilled instructor, be thoroughly interested in improving instruction, and be willing to devote considerable time to the careful coaching of individual instructors. One aid to the supervisor is the guide illustrated in Figures 4 and 5. This guide is designed to emphasize the key or major points to be observed in a lesson. Its purpose is to assist both the supervisor and the instructor in improving the quality of instruction. It is recommended that the guide never be used as a faultfinding or inspection device, but rather as a list of characteristics which the supervisors and the instructor may discuss with the objective of giving the instructor credit for what he has done well and of helping him in other elements in his teaching.

Special Schools and Courses

A number of especially designed instructor training courses are offered in the naval districts. Just recently each district director of training has been authorized a position for a civilian educator to assist him with naval reserve training problems. One of the major duties of this civilian educator, on the district level, is that of providing an instructor training course for naval reserve personnel. These courses are similar to those offered in the instructor

Fig. 3 (left). Training in the Instructors Schools, San Diego and Norfolk, includes operation and operational maintenance of motion picture projectors. Fig. 6 (right). Frequent staff conferences are held during the NROTC Orientation course. Staff, left to right: J. MacConnell, G. Balling, J. Dickinson, W. Conley, V. Gresham, and J. Lang

Guide for Observation of Instruction

This guide is designed to assist both the supervisor and the instructor. They should study it and be prepared to discuss the notes made on it following each observed lesson. The relationship between the instructor and supervisor must be one of understanding and co-operation in which both work to reach the same goal of providing the best instruction possible. The guide should never be used as a faultfinding device.

The following techniques are recommended for effective classroom visitation:

1. Make advance arrangements with the instructor to assure observation of a typical lesson.
2. Prepare yourself with information as to class schedule, instructor, trainees, and work underway.
3. Visit the various types of teaching activities conducted by each instructor.
4. Arrive before class starts. Advise the instructor of the purpose of your visit, and locate a suitable place for observation. If late, enter and locate yourself as quickly and inconspicuously as possible.
5. Participate in classwork only when requested by the instructor.
6. Observe the entire lesson.
7. Following the observation, complete your analysis by carefully appraising and filling in all items, using your own method of commenting.
8. Note strong points and list suggestions for improvement.
9. Confer with the instructor soon after the visit to discuss findings and work out details for improvement.
   a) Mention strong points first.
   b) Discuss weak points and make positive suggestions for improvement.
10. File this guide for the purpose of comparison with later observations to determine the extent of improvement in each instructor's techniques.

Fig. 4

Guide for Observation of Instruction

Instructor .....
Date..... Period..... School.....
Lesson Title .....

I. Student response
   Attention .....
   Voluntary questions .....
   Participation and application.....
   Co-operation .....
II. Instructional techniques
   Introduction to lesson.....
   Selection of teaching methods....
   Organization of material .....
   Emphasis on major points.....
   Class leadership .....
   Utilization of training aids and equipment .....
   Questioning procedure .....
   Use of time.....
   Provision for student application .....
   Summary and assignment.....
III. Personal characteristics
   Speaking characteristics .....
   Poise, mannerisms, movement.....
   Enthusiasm .....
   Resourcefulness .....
IV. Classroom, shop, or laboratory
   Light, heat, ventilation.....
   Arrangement of equipment and training aids .....

Fig. 5

training schools, however, each course is modified slightly in terms of the particular group of reservists reporting for training. The naval reserve is, therefore, provided with three levels of instructor training — instructor training courses in the instructor training schools, the district course limited to reservists within the naval district, and the courses conducted by reserve personnel within their own training centers.

Since the ability to teach is one of the qualifications for advancement for all petty officers, instructor training in the reserve training centers is a definite part of the training program for all personnel.

Class B Schools: Class *B* schools in the navy operate to train personnel in the qualifications for first class and chief rates. Each Class *B* school has included in its curriculum a unit devoted to the subject of instructor training. Thus, a graduate of a Class *B* school is trained both in the technical requirements of his job and in the technique of teaching in order that he may be more useful in assisting others when he returns to duty afloat.

The General Line Schools: The general line schools have, for the past several years, received the assistance of instructor trainers. This is done by providing an intensive instructor training course for officers recently assigned for duty as instructors prior to the convening dates for the general line school course each year. Several months later when the officers have had an opportunity to gain experience in teaching, and to try out the techniques discussed in the instructor training course, they are observed and assisted by a Bureau of Naval Personnel instructor trainer. This procedure, resulting in a practical instructor training schedule, has proved very successful in focusing attention on usable instructor techniques in these postgraduate schools. Since the work done by the instructor trainer is more like that of a coach than that of an inspector, the working relationship has always been pleasant and effective. *(To be continued)*

Objectives of Industrial Education

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1. To develop in each student the highest possible interest in the goals for which you wish him to strive in the future.
2. To establish the proper ideals and add these to the conviction developed as to the worth or value of the proposed goal.
3. To develop interest in industrial education, and guide student thinking in that direction.
4. To stimulate that interest with a desire for knowledge.
5. To perpetuate that interest to the end, to which all knowledge is a means.
6. To provide participating experiences which will offer the opportunity to each student to become a leader and a follower.
7. To develop effective health-safety consciousness, as it relates to present industrial methods, equipment, and muscular co-ordination.
8. To develop the ability to carry out a clearly defined plan of action.
9. To develop in the pupils a strong interest in the new ability which they are about to acquire, and the ideal of mastering it thoroughly.
10. To develop in each student a strong interest in the manipulative ability which they are about to acquire, and the ideal of becoming skillful in its performance.

Some Leaders in Industrial Education

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(Continued from page 394 of the December, 1949, issue)

Ferdinand Theodore Struck

My acquaintance with the subject of this sketch began at Teachers College, Columbia University, New York City, during the academic year, 1913–14, when we were fellow students in the graduate school. He was awarded the master's degree in June, 1914, the same month in which I completed my work for the doctor's degree. We were both extremely "busy" that year, and our acquaintance was little more than that at that time.

In the fall of that year he was appointed director of the Vocational School, West Orange, N. J., and in August I was appointed specialist in industrial education in the U. S. Bureau of Education in the Department of the Interior, now the U. S. Office of Education in the Federal Security Administration. We kept up our acquaintance through meetings rather regularly once or twice a year at educational conventions, but unfortunately I never had the opportunity to visit him in the places where he lived and worked.

Early Life

Ferdinand Theodore Struck was born in Hamburg, Germany, March 18, 1886, and died at his home in State College, Pa., following a heart attack, November 22, 1943.

He was the first-born of eleven children, the son of Ludwig Christian and Bertha Runge Struck. His father was an architect and contractor. In 1893, when Theodore was seven years of age, his father encountered financial reverses on a large government project in Hamburg. Because of these difficulties, brought about in part by the almost world-wide depression of that period, his father was unable to complete his contract, and heavy losses left him bankrupt.

That was the year of the great World's Columbian Exposition in Chicago, 1893. Advertising carried around the world fabulous tales of the United States as the land of opportunity. Theodore's father was not only attracted by the promise of an opportunity for a fresh start, he was also worried about the three years of compulsory military training required of all boys in Germany at that time. After many family conferences, and after weighing all the risks, it was decided to migrate to America.

They left Germany in June, 1893, and arrived in America on July 1. Their first home in the new world was in Milwaukee, Wis., where the father obtained employment as a carpenter. Ferdinand entered school in September, and found a part-time job in a cracker factory in order that his earnings might help support the family. Three years later, in 1896, the family moved to Rib Lake, a small town in northern Wisconsin. Here Mr. Struck purchased a small homestead in the timber, and with the help of the older boys earned the family living by cutting and selling hemlock bark.

In 1898, the elder Struck was informed of the serious illness of his mother, who had been left behind in Germany. In the hope of seeing her again before her death, the family made the long trip back to Germany. A year later, in 1899, following the grandmother's death, the family returned to America, and this time settled on the west coast. After nearly a year in Portland, they moved to Hood River, Ore., where Ferdinand spent the remainder of his boyhood days.

In Hood River, Mr. Struck started a fruit ranch, and with the help of the entire family he soon built up a prosperous place. Later, he traded the fruit ranch for a larger place, better suited to stock raising. One by one as the boys became old enough they began doing carpenter work under a local contractor, receiving valuable training in this way. The boys also aided in building the family home.

Dr. Ferdinand Theodore Struck

Ferdinand completed his high school course in Hood River, in 1907, and was valedictorian of his class. This class was the first to complete the four-year course in the Hood River high school.

College and Professional Preparation

Following graduation from high school, Theodore entered the University of Oregon, at Eugene, and was graduated in 1911 with the degree of bachelor of science in civil engineering. During his college days he secured part-time empoyment as a draftsman in an architect's office. He was also student assistant in the woodworking shops in the College of Engineering for one year, 1909–10. Also, while a student at the University of Oregon, he was a member of the varsity track team, competing in the hammer-throw and shot-put events.

Teaching Experience

His first teaching experience was as a member of the faculty of Stadium High School, Tacoma, Wash., where he taught woodwork and mechanical drawing for two years, 1911–13. During this period he was also coach of the high school track team.

I remember very well two visits to Tacoma, and the Stadium High School — the first about 1916, and the second a few years later — during my term of service with the U. S. Office of Education. I remember being impressed by the architectural feature which is responsible for the name of the school, namely the huge and magnificent concrete stadium, built in the form of a horseshoe, around the sides of a natural ravine adjoining the school grounds on the north. The open end of the horseshoe faces the water, so that the spectators have a wonderful view of the reaches of Puget Sound, and the range of mountains beyond.

The building was first occupied as a school in the fall of 1906. It is a typical example of French Chateau architecture, and is thought to be the only remaining example of this type of structure in America today. It was designed by a noted firm of Philadelphia architects.

Stadium High School is unique in many ways, not only in respect to its origin, but also in the fact that it is one of the few earthquake-proof public buildings constructed at the turn of the century. The building was made earthquake-proof by ⅝ by 5-in. steel bands, which completely encircle the building at the window-ledge level on each floor. In spite of the fact that it is perched precariously on the bluff overlooking the bay, not a single vertical or horizontal crack has ever developed in the building. The original walls are of masonry and brick, with some concrete used in subsequent modifications and alterations.

A Turning-Point

Experience as a draftsman in an architect's office, also as a carpenter while associated with his father in building construction, combined with four years of training in a college of engineering, convinced Mr. Struck that his interests and aptitudes were concerned with things mechanical. He found great pleasure and satisfaction in his work with high school boys as a teacher of industrial arts. At the same time the ambition was forming in his mind to prepare himself to be an architect and, in 1913, he resigned his position at Stadium High School, and went to New York City with the intention of seeking further training.

In his search for information upon which to arrive at a decision, he consulted a number of advisers. After listening to the best counsel he could find, and after studying catalogs and prospectuses, he came to the conclusion that the provisions for graduate study in architecture that were available at that time did not seem to promise the results he had been dreaming about as he tried to construct his future. At about this time he was urged by some of his newly found friends and advisers to consider the possibilities in the field of industrial education. He had come to New York at just the opportune moment to observe at firsthand certain phases of the campaign of enlightenment then being conducted by the old National Society for the Promotion of Industrial Education.

A visit to Teachers College, Columbia University, resulted in significant conferences with leaders there. He learned more of the movement that seemed to be sweeping the country, and he caught a vision of the inevitable demand for trained leaders in each of the 48 states as soon as legislatures could be aroused to action. Even more important to his own personal future, he learned that his training and practical experience in the building construction trades and in architecture, his four years of engineering college training, and his experience as a teacher of shopwork and mechanical drafting, combined to afford an unusually advantageous background for entrance into the field of leadership in industrial education.

Accordingly, he enrolled as a graduate student at Teachers College in the fall of 1913, and the following June he received the master's degree, and thus began a new phase of his career in industrial education.

A Leader in Industrial Education

In the fall of 1914, Mr. Struck was appointed director of the Vocational School in West Orange, N. J. The following year a reorganization was effected, and this school became a unit of the Essex County Vocational School for Boys. Mr. Struck continued as its head instructor for three years, 1915–18. During this period he was continuing his graduate studies at Teachers College.

In 1918, he was appointed associate professor of agricultural education at Pennsylvania State College, where he remained for two years. During this period he taught courses in agricultural shopwork, supervised the teaching of farm shopwork, and carried on an extensive and detailed analytical study of 350 successful farms in Pennsylvania. The data assembled in this investigation were used as the basis for his doctor's dissertation, the title of which was, *Farm Shopwork in Pennsylvania.* Upon the completion of this work, he was awarded the Ph.D. degree by Teachers College, Columbia University, New York, in June, 1920.

In the fall of that year, Dr. Struck was appointed assistant director of vocational education, with the duties of state supervisor of trade and industrial education, in the State Department of Public Instruction, Harrisburg, Pa. He was later promoted to state director of vocational education, and remained in Harrisburg until 1926.

In the summer of 1926, Dr. Struck returned to Pennsylvania State College, with appointment as head of the Department of Industrial Education, and the rank of professor. Here he remained until his untimely death in 1943, with the exception of six months, January to June, 1941, during which period he was granted leave of absence to serve as consultant in vocational education with the U. S. Office of Education, Washington, D. C.

Preparation of Teachers

Dr. Struck's greatest service to the cause of industrial education, as well as the major portion of his professional career, was in the preparation of teachers. "Under his leadership the Department of Industrial Education at Pennsylvania State College became one of the leading institutions in the United States offering professional and graduate work in industrial education, annually attracting teachers, administrators, and other students of the subject from all sections of the nation as well as from foreign countries."

Dr. Struck was one of the earliest leaders to point out certain major obstacles that stand in the way of an assured supply of capable and professionally trained teachers for industrial schools and classes:

1. It seems to have been generally recognized from the beginning that to be a successful teacher of any mechanical trade, the candidate must have had at least a certain minimum amount of practical working experience in that trade.

2. Further, to be a successful teacher, the candidate must possess certain indispensable qualifications of personality, character, health, and general education, in addition to at least a certain minimum amount of special preparation for the work of teaching.

3. The very fact of possessing these unusual combinations of personal qualifications and practical experience, insured that acceptable candidates would be found only in the upper levels

of the trades — men and women in the upper income brackets in their chosen callings.

4. Because of the impossibility of insuring an adequate supply of industrial teachers possessing these desired qualifications, at the same time willing to give up their preferred positions in industry to accept the positions and salaries offered by the schools, the State Departments of Education found it necessary to compromise their customary standards of qualifications for the profession of teaching, and to lower the requirements for certification (in comparison with those maintained for academic teachers of equivalent rank) to the levels at which it was possible to secure eligible lists.

The inevitable result of these conflicting forces was the employment of men and women as teachers in industrial schools and classes, many of whom never knew the real spirit of the teacher, and many of whom were quite untouched by the zeal for continuous professional growth and self-improvement that inspires the real teacher. Content with the fatal dogma, that "anyone who knows a thing can teach it," and satisfied with procedures and techniques that will "get by," such teachers never know or experience the incentive to discover better procedures and techniques.

Dr. Struck recognized in these conditions one of the major problems of industrial education, and addressed himself to the task of doing something about it. In his books and magazine articles, in addresses at professional meetings, in summer session conferences, in season and out, he urged the leaders to study ways and means for the improvement of teaching methods and procedures in industrial education.

Under Dr. Struck's leadership, Pennsylvania State College inaugurated a program of in-service training courses for trade and industrial teachers. Some of these courses were offered by extension in various communities where large enough numbers of teachers could be brought together to organize classes. Other special short courses were offered in the summer session on the campus. Still other courses were made available through correspondence.

(To be continued)

The Master's Degree for Industrial-Arts Teachers

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The young man preparing to be an industrial-arts teacher or the teacher with a few years of experience must look forward to earning at least one advanced degree. The master's degree is almost a universal requirement for the active teacher. The salary differential as well as the opportunity for promotion make it obligatory for the young teacher to plan for securing this degree. Social and professional approval are by-products of the advanced degree. The doctorate is not as widely pursued by teachers in public school positions. It may be predicted that nearly all of the supervisory positions in the larger city school systems will in the reasonably near future be filled by men with the doctor's degree. This will especially be true of men in college positions where teacher education in industrial arts is the objective.

During the next ten to twenty years, graduate schools will be crowded with industrial-arts teachers working principally on master's degrees, although the number working toward the doctorate will increase sharply over pre-war levels. Already a substantial number of veterans are attending college with the intention of completing this advanced degree before beginning their teaching career or before returning to teaching. Some of the current problems and trends of master's degree education will be presented in the following paragraphs. The basis for the discussion in addition to a limited search of library material is a study of more than 100 catalogs from colleges where industrial-arts teachers are prepared.

Purposes of the Master's Degree

It costs the teacher at least $75 per credit hour to go to graduate school. He must not only pay for all expenses incurred, including living costs, travel, enrollment fees, tuition, books, etc., but loses at least $200 per month in earnings since all industrial-arts teachers are employable at fair wages. When the teacher begins his graduate work, he should recognize these primary values which result from his school attendance: (1) Graduate work should make of him a better teacher — a master teacher. (2) If the student plans work on the doctorate level, he prepares himself for the advanced study, and (3) graduate work matures the thinking ability and develops the individual in the application of the scientific method to the solution of problems. Specific purposes of graduate study for industrial-arts teachers in the writer's own school are summarized as follows:

1. To improve and extend the teaching ability of the graduate student through advanced study of the philosophy of and newer methods in industrial-arts teaching.

2. To develop ability in writing, through the production of short reports, term papers, instructional materials, and reports of individual investigations.

3. To extend the knowledge and ability of the individual in definite industrial-arts subject matter areas.

4. To extend the knowledge of the professional literature of the general field of industrial arts.

5. To extend the acquaintance of the student with the professional leadership in the field of industrial arts.

6. To emphasize the importance of and provide experience in the use and application of the scientific method — the methods of research — the true thinking act.

7. To provide a broader understanding of changing objectives and current practices in the field of general education.

8. To review and evaluate recent and current research programs pertaining to education, guidance, testing, and other areas of general education and more specifically, those pertaining to youth problems, vocational industrial education, and industrial arts education.

What State Colleges Should Offer the Master's Degree in Industrial Arts Education?

The school should be one in which there is a strong college of education. It should have a virile undergraduate department of

industrial-arts teacher preparation. There should be few enough graduate schools for industrial-arts education so that good class size can be maintained in graduate courses. The industrial-arts faculty should consist of several teachers of whom two or more should have earned the doctoral degree. The trend is probably for too many schools to offer graduate work in industrial-arts education. It would be ultimately advantageous for the industrial-arts teacher to search out a graduate school with a good faculty, good physical equipment, a reasonably large enrollment in graduate courses, and especially one with a good reputation for scholarly work. Two evidences of a "good faculty" are advanced degrees and professional ranks. Why should a teacher go to a school and study under the holder of a Master's Degree with the rank of assistant professor? This paper will deal with several phases of graduate work in selected colleges and universities where industrial-arts teacher education is available.

Entrance Requirements. The standard baccalaureate degree with an undergraduate industrial-arts major is usually required for admission to a graduate program in industrial-arts education. One catalog contains this statement: "The work already done by the applicant must have included adequate preparation for the successful prosecution of graduate work in the special lines chosen." Two conditions have caused a liberalization of the entrance requirements for graduate study in industrial-arts education. First, the increase in the number of practical work courses for which graduate credit is given makes it possible for a person with a partial undergraduate major to complete this major with graduate courses. Second, the critical teacher shortage inclines the graduate adviser to overlook some of the less essential entrance requirements. The shifting to industrial-arts teaching at the graduate level is made easier if some certificate requirements can be met by completing graduate courses.

The Entrance Examination. It is by no means unusual that a psychological test is given to all entering graduate school students. Few would question the desirability of an evaluation of the general ability of the candidate when he begins his graduate work. The Graduate Record Examination published by the Carnegie Foundation, for the advancement of teaching, was mentioned in several catalogs. This examination has been taken by more than 30,000 students in the past five years, of whom 12,000 were beginning graduate students.

Degrees Given. The master of science (M.S.), the master of arts (M.A.), and the master of education (M.Ed.) degrees are given with almost equal frequency.

In many cases the field of specialization is named, as, for example, the master of science in industrial-arts education is the master of arts in education. Several schools distinguish between these degrees. A mastery of one language may be required for the M.A., a thesis for the M.S., whereas the M.Ed. degree may require a field study with a report.

How Many Schools and Colleges Offer the Master's Degree in Industrial-Arts Education?

This report does not have the exact answer to the foregoing question. When Fryklund conducted his investigation of undergraduate programs of teacher education (4)* which was published in 1941, a total of 180 information forms were sent to as many colleges and universities. Among the 112 replies were 22 where no industrial-arts courses were offered or where it had been discontinued. Ninety schools in 34 states returned completed information forms. The chart shown as a part of this report, includes only 35 colleges and universities where the master's degree may be secured. There may be more graduate schools where the graduate degree can include a major in industrial-arts education but time limitations for completing this study resulted in the failure to find them. In a few states, notably Texas, all teacher colleges grant the master's degree, however, majors in industrial-arts education are not available on the graduate level in all of them. Feirer (3) found 45 schools offering master's degrees with a major in industrial-arts; however, he seems to confuse courses and majors in "industrial education" with specific credits in industrial-arts education.

Grade Requirements

The universal requirement in regard to grades is a "B" average. The requirement may be stated differently in various catalogs but the graduate student is expected to maintain a higher grade average than the undergraduate. In some institutions candidates have been failed through continuing to receive "C" grades.

Language Requirements

In no school is there a definite requirement of a foreign language. At the University of Illinois, one degree, the master of arts, is titled "the predoctorate" degree and one foreign language is required.

The Graduate Seminar

One distinct evidence of the maturity of graduate offerings in an institution is the "graduate seminar." Here graduate students meet and discuss research techniques and research projects that are in process. The exchange of ideas and the broadening of viewpoints and understandings in the field of industrial-arts education are by-products of the graduate seminar. While in some places, the seminar may be a tradition and nerve shattering period, it can be made the stimulating origin of satisfying progress.

Graduate Industrial-Arts Education Courses in Research

Because of the newness of the idea of industrial arts as a school subject in the general education group, a very small amount of significant research has been produced by its teachers. The percentage of teachers in industrial arts who have advanced degrees is still relatively small. Fryklund found only 18 Ph.D. degrees among 329 college professors in industrial-arts teacher education departments (4). Only 73 per cent of these teachers had degrees beyond the bachelors.

Few significant research reports on industrial-arts subjects are available for undergraduate and graduate students to study. Only a half dozen dissertations on industrial-arts subjects have been printed and most of these are now "out of print." Few research workers in this field ever complete more than one or two investigations and these are usually required for their advanced degrees. Few men in administrative positions have undertaken any research projects in connection with their school duties. Few college professors of industrial-arts education subjects have produced research reports. Practical difficulties including financial limitations, unavailability of experienced research personnel and the complexity of the real educational problems have made it difficult to initiate and complete any extensive research enterprises.

In spite of the fact that research papers dealing with industrial-arts problems are limited to a half dozen independent investigations like the Minnesota Mechanical Ability Study, The Terminological Investigation of the Western Arts Association, and Fryklund's Teacher Education Study, to about 25 or 30 doctoral dissertations on strictly industrial-arts subjects and to several hundred master's theses, professors in graduate departments are encouraging research in this field by conducting special graduate courses in industrial-arts research. Feirer who completed his Ph.D. work at the University of Oklahoma last year studied these offerings (3). He found that in 32 colleges and universities, re-

*See bibliography at end of this article.

search courses are offered in 21 and required of master's degree candidates in 19. By means of an inquiry form he secured information from 33 heads of departments in as many colleges and universities concerning research courses and activities in these departments. Twenty of these men had completed the doctor's degree. Feirer included in the final section of his dissertation a detailed outline of a 3-hour course on industrial-arts research, which included the following general sections:

1. Research in industrial arts
2. Scientific approach to work in industrial arts
3. Selecting a problem
4. Planning the study
5. Surveying the literature
6. Selecting the research method
7. Preparing the techniques
8. Collecting the data or information
9. Working on the data or information
10. Writing the report and interpreting the results

An abstract of his dissertation has been published by Dr. Feirer and copies can be secured by addressing him in care of the Western Michigan College, Kalamazoo, Mich.

The importance of this phase of graduate work in industrial-arts education cannot be overemphasized. This quotation is taken from the *Encyclopedia of Educational Research* (7, page 681): ". . . educational research is not simply an abstract concept, it is a dynamic movement in contemporary education." The research method as applied to education should not be an iron bound procedure but should rather be a refinement of the normal process of problem solving. Education is at times variously a science, a technology, and an art. Research can improve it in all of these aspects.

Needed Research Enterprises

Almost all problems of education are included in the study of industrial arts as a school subject. The total amount of research applied to problems of organization and administration to methods of teacher education and to other specific aspects of industrial-arts education is pitifully inadequate. However, the fundamental problems of the secondary school curriculum and the place of industrial arts in secondary education overshadow all other problems needing research. Answers are needed for questions like these. How educate our youth for intercultural unity? How best serve the needs of noncollege going students? What type of general education is of most value for high school youth? What can be done to aid youth in making proper contacts with the occupational world? At what age will youth leave school? What adult needs can industrial arts meet? The resolution of these problems can be accomplished most effectively through experimentations and research. Fryklund (4) lists twenty problems needing immediate and extended investigations. Hunter and Smith listed hundreds of unsolved problems.

The Thesis and the Dissertation

These terms are frequently used interchangeably to designate a relatively extensive written report required in completing an advanced degree. In preferred usage the term *thesis* should be reserved for the master's degree requirement which is expected to reveal ability to think independently and to carry forward an extensive research project properly delimited and culminating in a logical or scientific solution. The thesis is not necessarily a research project in its truest sense. The *dissertation*, as differentiated from the thesis, represents the report of a doctoral investigation project. This report should represent the solution of a complete research enterprise which represents a somewhat extensive original investigation involving independent thinking and the application of appropriate research techniques leading to logical and sound conclusions couched in good literary form. The dissertation should be worthy of publication.

Several catalogs indicate that when a graduate student expects to become a candidate for an advanced degree, the experience of writing a master's thesis is advantageous. At the University of Michigan a person who plans to continue graduate work toward the doctorate, *must* prepare a master's thesis or an equivalent research report.

The Report

In some schools where the thesis is waived, a "report" is required. This may be an extended term paper or it may be an independent investigation of a problem in industrial-arts education carrying two, three, or four hours of credit. The report is a small research experience and requires careful planning and writing.

The Trend Toward Allowing Graduate Credit for Laboratory and Advanced Shopwork Courses

There is a definite trend in this direction. When a student completes the minimum undergraduate requirements for a major or for a degree he may be poorly prepared to teach. Another may secure a position where he must teach an industrial-arts subject for which he had little or inadequate undergraduate preparation. Still others may have received their undergraduate training in a poorly equipped shop. These and many other conditions make it desirable that advanced work in shopwork subjects be allowed for graduate credit. As early as 1930 graduate students in Ohio State University were taking ceramics courses and certain art courses as a part of their graduate work. Kent State University offers six 3-hour credit "performance" type courses on the graduate level. Stout Institute had a number of seemingly "performance" type courses in the 1945–46 catalog. At the Oklahoma A. and M. College where improving the teaching ability of the candidate is one of the major objectives of the master's degree, seven three-hour "performance" courses called "Problems of Teaching . . ." in as many separate industrial-arts subjects are offered. No one graduate student takes all of them but frequently three or four are found to be included in a graduate study plan.

Workshops in Industrial-Arts Specialization

Very strangely the "workshop" type of graduate program has had very little application in industrial-arts teacher education centers. A "Workshop in Craft Work" was included in the 1947 summer session at the Oklahoma A. and M. College. Two workshops were held during the 1948 summer session, each of which was four weeks in length. A "Workshop in Test Making for Industrial-Arts Subjects" and a "Workshop in Producing and Using Visual Aids for Industrial Arts Courses" was held in 1949. Prof. Weaver of the University of the state of New York has conducted a workshop on visual aids with good success. The purpose of the 1947 workshop at the Oklahoma A. and M. College was to provide instruction for summer playground craftwork teachers and for camp craft instructors. The two workshops for 1948 were planned to meet the needs of persons who desire to go to summer school for only one month.

Safety Education

This subject seems to have no home among college departments. It was found that a half dozen industrial-arts departments have one or more safety courses included in their catalog offerings. In some courses the emphasis seems to be on industrial safety which would be very helpful as a graduate course for industrial-arts teachers. In other schools the courses relate to driver training and motor vehicle traffic safety. General safety education appears more infrequently but needs more emphasis since three times as many people

lose their lives in public, home, and farm accidents as in automobile accidents.

Other Controls Over Graduate Work

In many schools, definite majors and minors are required. In all schools a plan of study must be prepared and a definite purpose for the graduate program must be evidenced. The requirement of a certain number of hours of "education" courses as the accompanying minor for a major in a teaching field seems to be a wise one. Where there is a department of industrial-arts education and a department of trade and industrial education, the choice of a major in one field and a minor in the other is one alternative.

Correspondence courses are almost never allowed as graduate course credits. Utah State College allows nine hours of correspondence credit for the master's degree. Extension courses are likewise limited since in the case of an extension course, the student cannot have the use of library and other college or university facilities. The amount of extension course credit is usually limited to six to nine hours. The transfer of credits from one institution to another is severely restricted. Few institutions will allow more than eight hours of credit from another institution to apply on the master's degree.

Industrial Arts and Vocational Industrial Teacher Education in the Same College or University

There are three types of graduate schools in industrial education (industrial education is here used as a broad general term including all shopwork and industrial drawing courses taught for any purpose whatsoever). First, there are probably 100 colleges and universities in which a single purpose department prepares industrial-arts teachers. Then there are nearly 48 state schools which are by contractual agreement designated as the teacher training centers for all subsidized vocational-industrial positions under the federal vocational education laws. In these two groups the objectives and goals are clearly evident. The third type of organization is the school where an advanced degree in industrial education is awarded and an effort is made to provide equally for the individual needs of the teachers in the two groups. In the final outcome, practically all of the courses are organized to meet the requirements of the state plan for the preparation of vocational industrial teachers and problems of industrial-arts teachers are minimized.

There are several graduate courses which could be "common" courses for these two groups if they could be taught without the influence of the federal subsidy and without intentional efforts of indoctrination. Courses in the history of industrial education, in guidance and in testing should be taught with a scholarly approach and with no hidden purposes of influencing the pupils in the courses and could be required of both industrial arts and trade industrial students. All other graduate courses should be separate courses.

Several colleges and universities have combined departments of industrial education in which undergraduate degrees in both fields are offered. Graduate work in both fields is also offered in these schools. In almost all cases, specialized courses in trade and industrial education predominate. It should be stated here that a large percentage of supervisory positions in city schools will be filled by men who have qualified and served as trade teachers and who have completed graduate work in trade and industrial education. The commoner practice of employing one supervisor for both industrial arts and trade course instruction demands a supervisor who knows both subjects. The teacher with an undergraduate major in industrial arts, a graduate degree in trade and industrial education, teaching experience in both and a doctorate degree in either will be the most likely prospect for the city supervisor of the combined program. Many cities having separate supervisors for the two fields and the colleges and universities with separate departments provide teaching and administrative positions sufficient for all who wish to specialize in either field through the three degrees, bachelors, master's and doctor's.

Another weakness in graduate programs is the failure to require courses in educational philosophy and statistics. The industrial-arts master's degree graduate is too provincial.

The organization of graduate work in colleges and universities varies from state to state. In Michigan the teachers' colleges cannot grant the master's degree. The University of Michigan must grant the degree and all candidates must complete at least six credit hours of graduate work in the university. Several schools offer no graduate work in industrial-arts education during the regular term. Colorado State College has an invited faculty of qualified instructors for each summer term which in conjunction with the weather, climate, and scenery have resulted in a splendid summer school enrollment. Other schools have close relationships to local school groups and thus have good graduate school enrollments. Wayne University in Detroit and New York University in New York City have many late evening classes and night classes because of local enrollees.

Nothing has been written in this article about the physical equipment available in graduate departments nor have library facilities been evaluated. Both of these as well as comfortable classrooms and living quarters are essential to the successful completion of the master's degree.

Summary and Conclusions

The master teacher aim is most commonly accepted as the chief purpose of graduate work at the master's degree level. The research aim and the leadership aim are almost evenly rated in second and third places. The requirement of a thesis is being replaced by a strong graduate course in research in industrial-arts education with a required research report of significant extent. The "report" is sometimes a term paper requirement of the research course and at other times a two- to four-hour credit problem. One of the chief weaknesses in graduate programs in industrial-arts education is the omission of an intensive course in the history and philosophy of industrial education instruction. The absence of this required course results in the granting of master's degrees to persons who know little of the historical background of the work to which they are devoting their lives. Too frequently they have little knowledge of the general objectives and the educational significances of industrial arts as a school subject.

One of the most urgent needs of the industrial-arts education teacher group is for a centralized publishing agency where reviews of research reports can be secured and where the more significant research studies can be published for general distribution.

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Problems and Projects

A SIMPLE ADJUSTABLE DRAFTING TABLE

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An inexpensive drafting table would be a welcomed addition to the collection of equipment most industrial-arts students find desirable.

This adjustable drafting table can be reasonably constructed in a very short period of time by most secondary students. The dimensions of the table should be worked out by the individual to fit his particular physical and drawing needs. The plan is simple enough to be readily altered if space, lumber, or needs demand changes.

Most students have trouble getting their drawings in on time and in the shop classes there are always a few who bring in drawings far below their abilities. This is due, many times, to the inadequacies of proper, if any, areas in the home where the student can sit down and do a proper job. This table will remedy such a situation to a degree, and present a useful project for the student.

Construction

One-inch pine will suffice for the lower members, except the two braces which could be somewhat larger and connected by a 1-in. dowel.

The top may be made of half-inch plywood, hinged to the two legs which would allow it to tilt to any of the desired angles.

If desired a thin strip could be screwed to the lower edge of the top so that a drawing board could be used for the drawing area.

SANDWICH TRAY

CHARLES K. HUGHES, JR.
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The small combination tray and napkin holder, shown in Figure 1, is very handy to have around the home. It may be used for serving drinks and sandwiches, or may be used for ornamental purposes. The napkin holder is intended to hold several paper napkins.

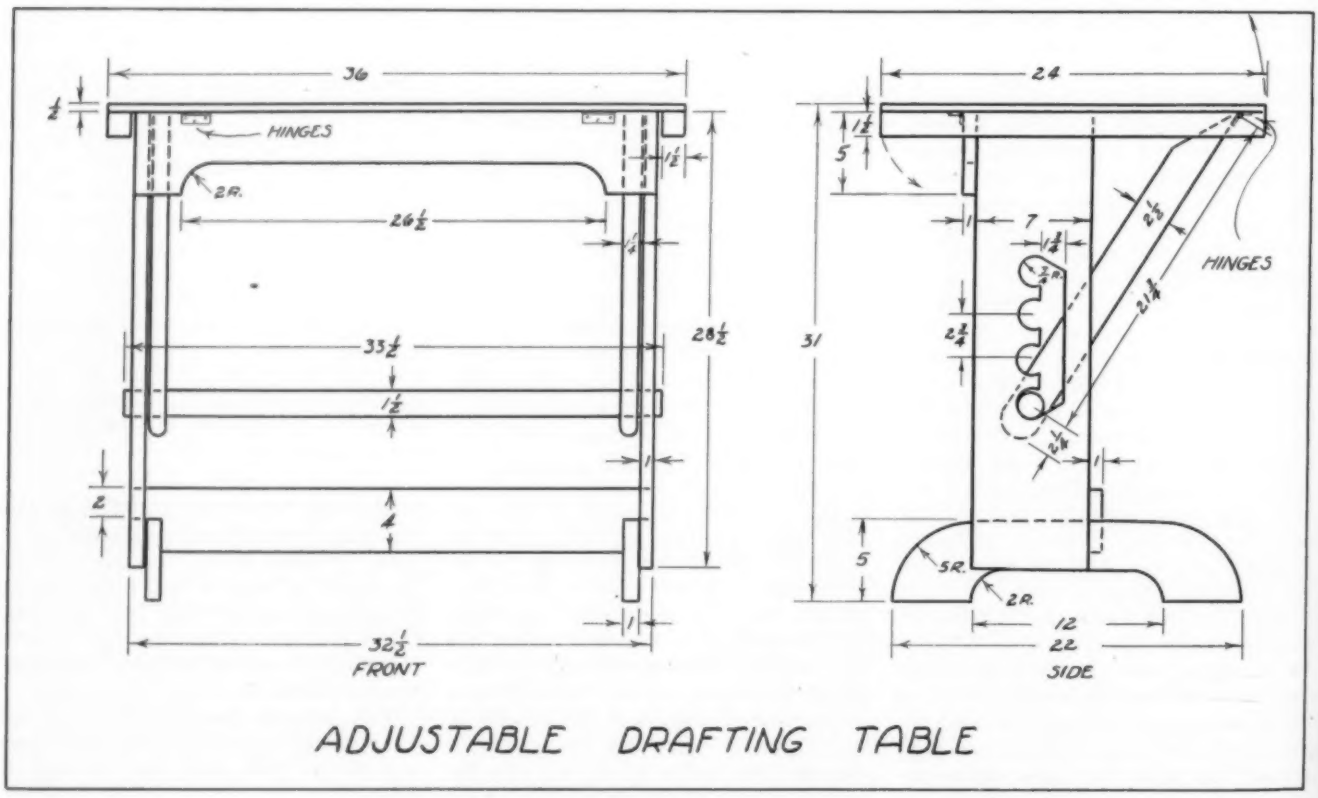
The project incorporates some basic processes which are fundamental to the field of art metal work. Included are the processes of piercing, peening, sweating, pickling, overlaying, and finishing. Etching may also be included but this is optional.

The project may be fabricated from any nonferrous metal. The tray described in this article is made of 14-gauge sheet copper.

Plan of Procedure

1. Refer to Figure 2 and make out bill of materials.
2. Obtain stock.
3. Lay out job on metal. The layout should be checked by instructor before any cutting is done.
4. Cut out project, allowing approximately 1/16 for filing.
5. Peen handles and napkin holder. Note that the napkin holder is peened on the side opposite that on which the handles are peened. A 4-oz. machinists' hammer produces very good results.
6. File all edges smooth.
7. Shape project. To avoid any difficulties in forming, shape the project as follows:

a) Bend the side opposite that on which the napkin holder is located.



Details of adjustable drawing table

Fig. 1. Sandwich tray and napkin holder

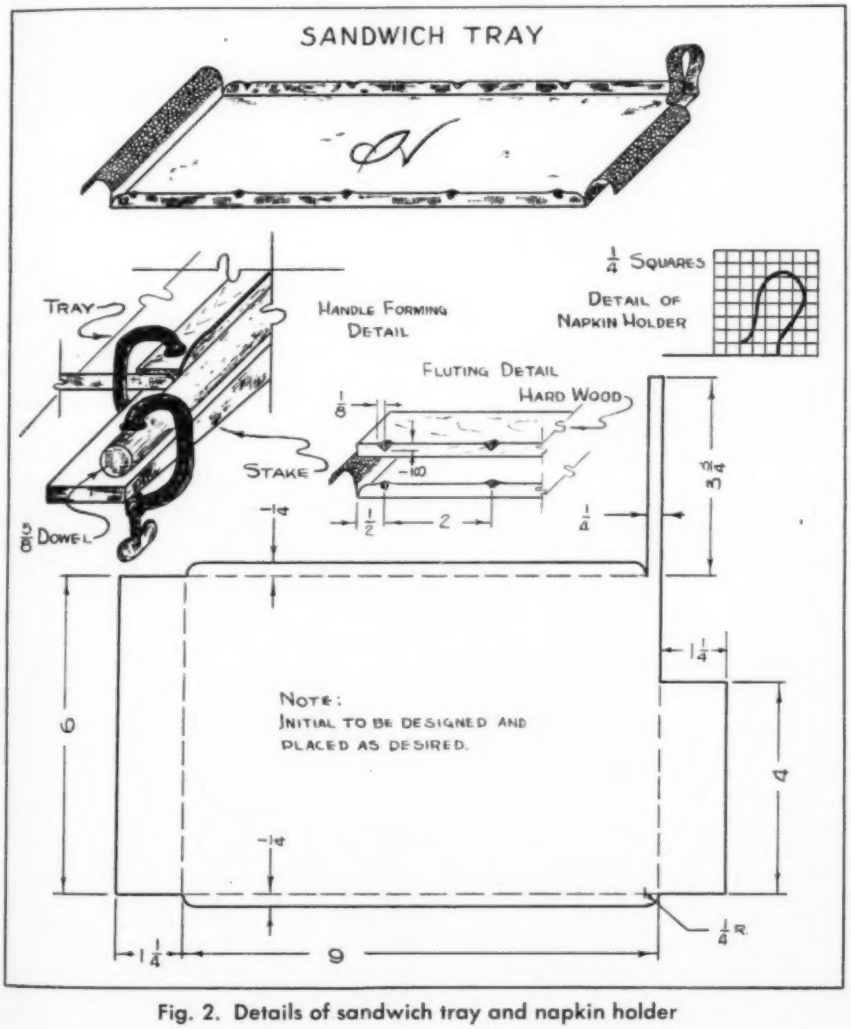


Fig. 2. Details of sandwich tray and napkin holder

b) Form the two handles as shown in Figure 2.

c) Bend the remaining side.

d) Flute both sides.

e) Shape the napkin holder.

8. Pierce initial, allowing approximately 1/32 for filing. If desired, the initial may be etched into the tray.

9. Finish. A good effect is obtained by satin finishing the bottom of the tray and bringing the handles, napkin holder, sides, and initial to a high luster. Satin finish the area where the initial is to be placed in order to eliminate the difficulty of satin finishing around the initial after it has been sweated on.

Apply wax or metal lacquer after desired appearance is obtained.

10. Sweat initial on tray. Avoid the use of too much solder when tinning the initial.

11. If desired, the underside of the handles and bottom of the tray may be covered with "Suede-Tex." This eliminates finishing and acts as a protector to furniture.

"Suede-Tex" consists of fine fiber strands made of rayon. It is applied with a high velocity spray gun to an adhesive undercoat.

References

Piercing: Kronquist, *Art Metal Work*, p. 4; Ferier, *Modern Metalcraft*, p. 79.

Peening: Kronquist, *Art Metal Work*, p. 16; Ludwig, *Metalwork, Technology and Practice*, p. 267.

Overlaying: Ferier, *Modern Metalcraft*, p. 249.

Sweating: Ludwig, *Metalwork, Technology and Practice*, p. 278.

Pickling: Kronquist, *Art Metal Work*, p. 8.

Fluting: Kronquist, *Art Metal Work*, pp. 54, 70, 148.

Finishing: Kronquist, *Art Metal Work*, p. 190.

"Suede-Tex," October, 1949, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine, vol. 38, No. 8, p. 36A.

DRAFTING IN THE OIL FIELDS

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Taft, Calif., is a community of approximately 15,000 people and lies in the southern end of the San Joaquin Valley. Due to the negligible amount of rainfall and irrigation impracticability, there is little agriculture. Oil production and associated industry have always been the chief support of the community.

The services of Taft Union High School and Junior College are free in every respect, transportation, books, paper, drawing instruments,

Student at work with drafting machine equipped with an engineer's protractor head. An electric erasing machine is shown at the left

Contour and relief maps

Above: contour maps. Left, subsurface or oil zone. Right, surface or ground level, both of the same section of land shown below in relief with oil wells located
Below center, log of an oil well showing the different formations and depth of each passed through during drilling

and all equipment needed. Students are transported as much as 40 miles by school buses to attend the day classes.

Since Taft is an industrial community, the industrial and vocational program is extensive.

We have always provided a four-year course in mechanical drawing for high school students and they have had good success at holding jobs in oil field drafting rooms.

A short time ago we decided to make a survey of local drafting rooms to determine if the mechanical drawing department should be expanded to include new subject matter and new courses. We found that a majority of oil field drafting rooms were divided into two departments or had separate drafting rooms: (1) for machine drawings; (2) for map drafting.

Our students had efficiently held jobs in machine drafting but were found to be lacking as to the needs of the map drafting department.

As a result of the survey made we have organized a class in oil field drafting. This class runs for a period of one semester and is open to enrollment to fourth-year students in drafting.

Oil field officials have fully co-operated with us by providing actual jobs from their drafting rooms. Thus our students gain firsthand information on the type of work which will do them the most good when they arrive on the job to earn a livelihood.

Enlargement of block-out area and model for making map

On the table is shown the photostatic enlargement of the small block-out area on the wall map. This area is Yosemite Valley, California, and will be used for a future project in the construction of a relief map
Left is a demonstration model showing the steps taken in making a relief map

The course as now laid out consists in laying out on paper the following items:

Oil Field Drafting Course

1. Pipe fittings
2. Flow sheet of modern absorption plant
3. Cost and production curves
4. Log of an oil well
5. Location of wells on producing property
6. Location of property
7. Contour maps, surface, and subsurface with profiles
8. Relief maps, surface, and subsurface.

A generous school board and administration have made equipment available to the students in this work which is modern in every way and includes everything from an adjustable drafting table and engineers' drafting machine down to contour and railroad pens.

With this special equipment available, the student tackles an actual drafting job and may do the work with the same degree of accuracy as demanded of the draftsman in the field.

Our course in oil field drafting was planned as a terminal course to prepare the students to follow drafting as a lifetime work, here or in some other oil field.

We installed this course about four years ago, and since that time we have found that our students are more efficient on the job and the oil field officials are better satisfied with the work done. They do not hesitate in taking our recommendations as to student ability.

USING THE MILLING MACHINE AS A LATHE

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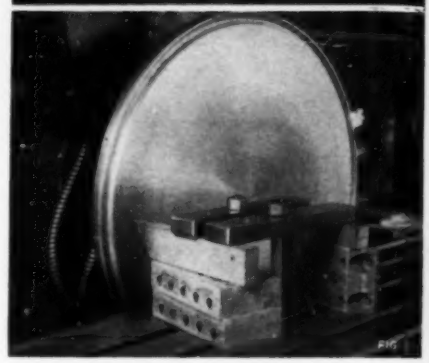
School shop lathes usually have a 9, 10, or at most, 14-in. swing capacity. Occasions arise when work larger than the lathe capacity must be machined. Acknowledging that these necessities are few and far between, these problems still remain to be solved or forgotten as unsolvable, acknowledging defeat and inability.

The machine tool trade through necessity and ingenuity has answered one phase of the problem, namely, the machining of large circular plates or work of similar nature both for roundness and facing. This solution is predicated on the assumption that the school shop has a milling machine.

Figures 1 and 2 show how the work is held and how the machining process is accomplished. Elaborating on these illustrations, the work is mounted on a large lathe faceplate, standard equipment, which is seldom used. It is not likely that the lathe faceplate will fit on the milling machine, consequently an adapter is necessary. Specifications and dimensions have not been indicated because of the multiplicity of different sizes involved on faceplates and milling machines. Once the faceplate is mounted on the milling machine the problem of holding a circular plate to the faceplate is identical to that involved in lathe work. Two or more holes are drilled and tapped through the metal to be machined so that machine bolts can be used to hold the metal concentrically to the faceplate. If through holes are detrimental to the finished product they need not be drilled completely through the stock, and the holes can be bottom tapped to accommodate the machine bolts.



The machining process

Above: Fig. 1. Method of mounting the work on the milling machine
Below: Fig. 2. Using the milling machine for doing lathe work

The tool bit can be mounted as pictured by blocking on square or rectangular cold rolled stock. Any type tool bit will work whether small, such as held in a toolholder, or large, such as the one shown in Figure 1. It is equally simple to clamp a tool bit holder or a large tool bit. The bit will have to be ground for the particular job. Experimentation or experience will determine the shape.

The plate shown in Figure 1 is the top of a base used for mounting a grinding machine employing a liquid coolant, hence the groove to catch the liquid.

With comparatively little effort and no expense a milling machine, regardless of size, can be set up to machine plates larger than most school shop lathes will accommodate. This application will undoubtedly suggest how to do other machining jobs. It will also suggest the possibility of ingenuity and problem-solving techniques applied to other problems which occasionally present themselves to the industrial-arts teacher.

CELSIUS VERSUS CENTIGRADE

The Ninth General Conference on Weights and Measures, held in October, 1948, adopted the name "Celsius" for the scale of temperature which has more commonly been called "Centigrade." This action arose from a question regarding preferred usage in French, the sole official language of the Conference. The decision therefore may be considered as applying strictly only to that language. In the interest of eventual uniformity of practice the use of "Celsius" appears desirable, but it is not practicable to impose this term on those who prefer "Centrigade."

In preparation for the General Conference the National Bureau of Standards submitted a revised text defining the International Temperature Scale to supersede that adopted in 1927. The proposed text was drafted in English and, in accordance with common English practice as well as the official French text adopted in 1927, it used the name "Centigrade." This name was carried over into the French translation prepared for consideration by the Advisory Committee on Thermometry in May, 1948. However, in the printed report of that meeting, the term "Centigrade" had, in most cases, been changed to "Centésimale," the term that is used in the French law governing weights and measures. When asked to choose between the two the International Committee on Weights and Measures and the General Conference voted to substitute "Celsius."

National Bureau of Standards, U. S. Department of Commerce, Washington 25, D. C.

By October 1, 1949, nearly 7,000,000 World War II veterans have, at some time or another, had education and training under the GI Bill and Public Law 16 (for the disabled).

TEACHING AID FOR THE AUTO MECHANICS DEPARTMENT

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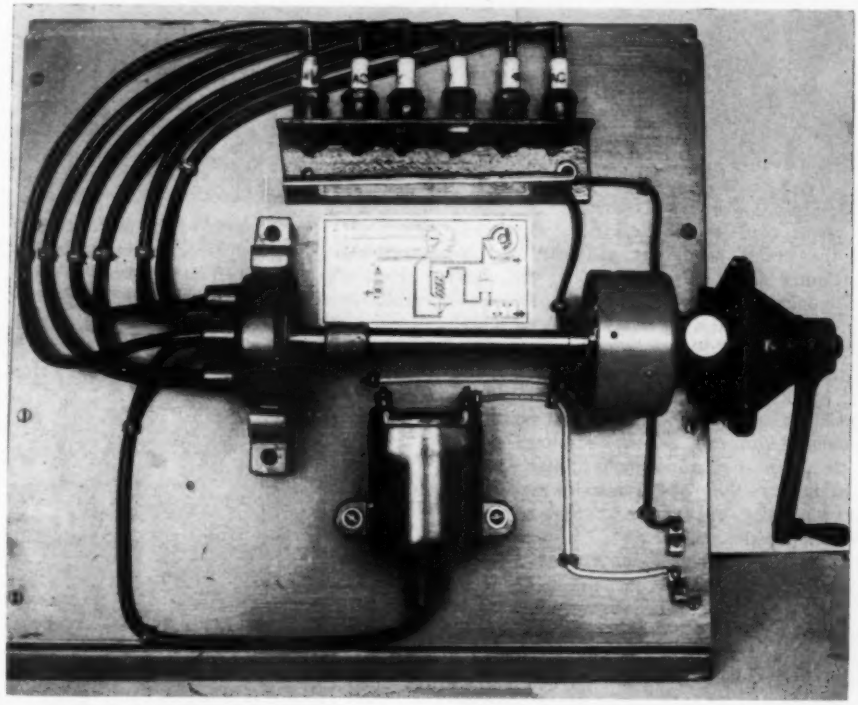
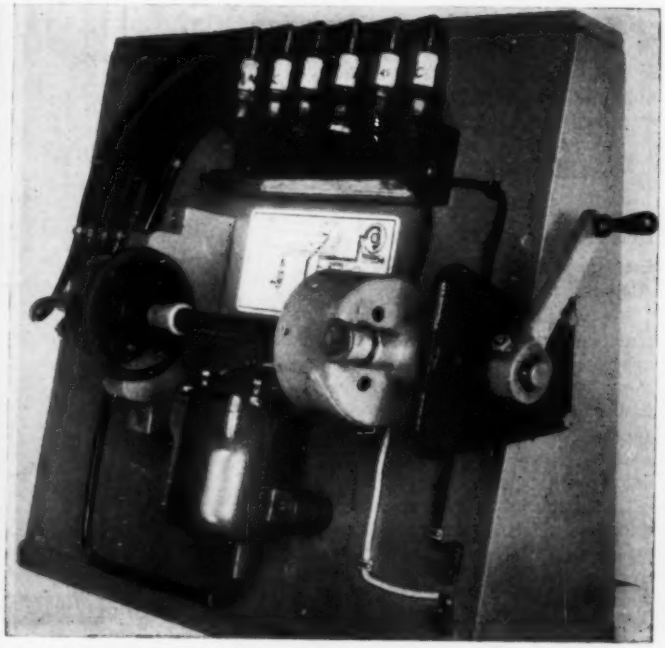
One of the focal points in the study of automotive electronics is the ignition system. At times the distributor assembly, its function, and mechanics of operation is difficult for the student to comprehend clearly. The exploded working model shown in this article has been found a most effective means of helping the student understand this part of the automobile.

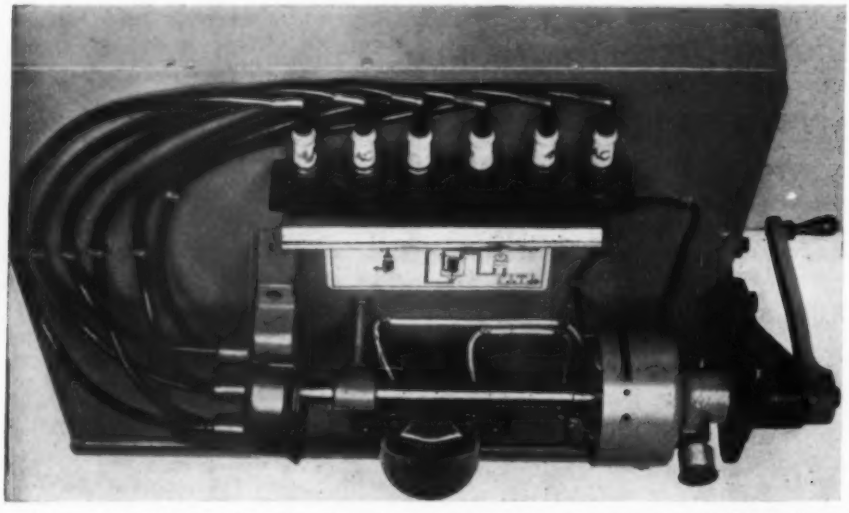
The accompanying illustration shows the model that is used in the industrial-arts department at the Weston High School, Weston, Mass.

The timing unit of the distributor and the rotor and distributor cap are separated from, yet connected in proper relationship to one another by means of a piece of ½-in. dia.





Various views of the model of the timing unit



by 8-in. cold rolled steel rod. Operation of the crank handle at the end of the distributor shaft puts into motion the various components of the distributor assembly. Because of the separation of these units, the student is able to witness the action of the fiber block against the cam, the make and break of the points, the operating relationship of the rotor to the contact points in the distributor cap, and the resultant spark at the plugs. A mirror is inclined at a 45-deg. angle beneath the plugs in order to make easy the witnessing of the spark from a seated position by the pupils.

The entire assembly is mounted on a ¼-in. plywood panel which is inclined at an angle of about 20 deg. The distributor cap is mounted on a 1-in. block of wood as shown. The cap is fastened to the block with two wood screws, and the block itself is secured to the panel with a machine screw at each end. At the rotor end of the shaft, an adjustable support maintains the shaft and rotor in proper relationship to the contact points in the cap. The entire unit is finished with appropriate color dynamics to distinguish the integral parts.

ELECTRICAL WELDING IN INDUSTRIAL ARTS

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Arc welding can be a useful unit of instruction in a variety of classes. It is naturally associated with machine or metal and auto shops, but will be helpful in general shops where more than one activity is proceeding and in which it is desirable to diversify the projects to give a well-rounded perspective of industrial life.

One of its advantages is that it requires a minimum of instructional supervision. Its safety coefficient is high and the students can work independently if the instructor is otherwise occupied.

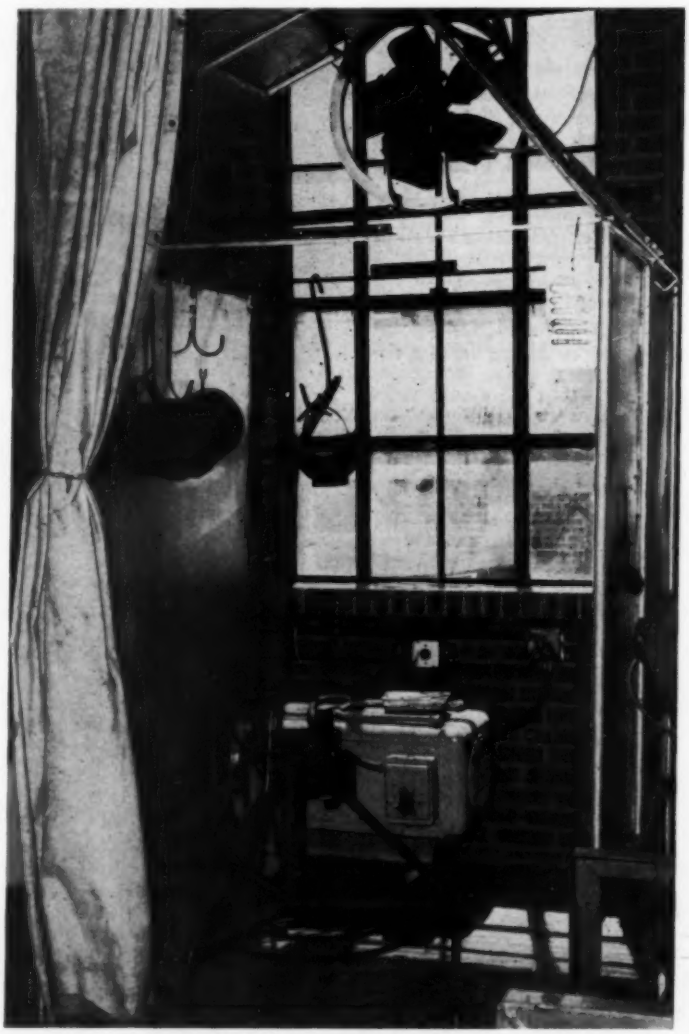
The work can consist of the simple processes of depositing beads and uniting specimens of scrap, or it can progress to the fabricating of worth-while projects. Pipe, rod stock, flat or angle iron can be welded into bookcases, tables, stands, or other objects, built wholly of metal or combining several other materials as well.

The cost is reasonable; a good installation will be less expensive than a standard lathe. Two general types are used; the motor-generator combination with direct current and reversible polarity, or the transformer type with alternating current. A 220-volt supplying current is usually required.

Ventilation should be provided as the fumes quickly fill a shop unless they are exhausted as generated; also the arc must be shielded from the vision of all other workers.

A fan can be mounted directly before any window that has or can be fitted with an opening section. One or more booths can be ventilated by the fan if they are fairly tight and their cover sloping to the apex immediately above the fan. Wood or light sheet metal can be used and a sliding canvas curtain for the front permits full benefit from the window when the booth is not occupied. The installation can be painted and need not be unduly conspicuous.

The instructor will find a welding unit most helpful in building shop models or equipment and in general maintenance work.



Electrical welding booth

A TRIANGULAR SCALE MODEL

R. E. MURRAY
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Public Schools
Fremont, Ohio

The writer, having consumed much time and effort in trying to teach his students how to read the different faces on a triangular scale, conceived the idea of constructing a large model as shown in the accompanying illustration.

This scale, approximately six times the original size of an ordinary triangular one, can be made in the sheet-metal shop involving a number of correlated operations plus a few machine-shop procedures.

After several coats of white enamel have been applied to the shell, ordinary India drawing ink may be used to put on the graduations and the numbers. This particular operation may be assigned to the drawing classes as it affords splendid inking procedure.

The pipe standards may be painted or enameled black, or they may be given a color harmonizing with those used in the classroom.

For classroom presentation, the writer found it helpful to give a short explanatory demonstration while each pupil had a standard size scale before him. This explanation was followed by a question and answer period, after which a written test was given.

SIMPLE LINOLEUM BLOCK TECHNIQUES

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State Teachers College
Bloomsburg, Pa.

For several years considerable effort has been made to find a simple but enonomical method of producing printing plates in public school art and printing departments. These new methods have met with indifferent success; after a few disheartening attempts, most school authorities revert to the linoleum block as the cheapest and most efficient method of producing relief printing plates.

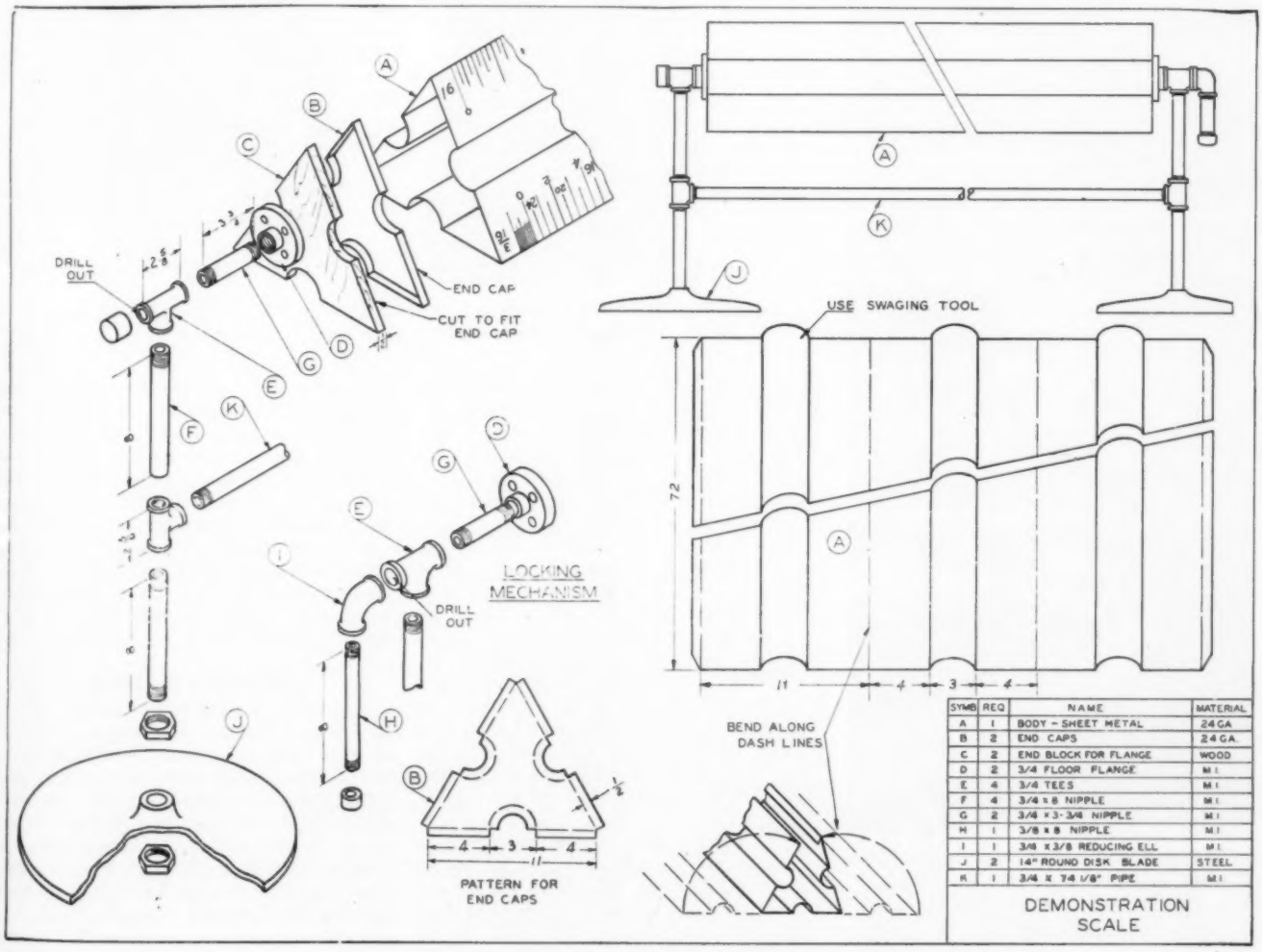
From the point of view of the instructor, linoleum is the ideal material for school use. First, it is cheap and can be supplied in large quantities by local dealers who regard small pieces as scrap and are willing to sell it for a few cents a foot. Second, it is easy to cut, as it has no *grain,* hence curves and circles may be cut as easily as straight lines. The cost of the cutters has also been reduced, and most schools can now afford to buy complete sets of the tools.

Materials

Linoleum blocks may be purchased from supply houses already mounted on type-high blocks, ready for the printing press as soon as the design is cut in the surface. These are fine to work with, but they are rather expensive and lack the flexibility of the unmounted plate. Unmounted linoleum of the *battleship* grade which is approximately ¼-in. thick can be purchased in most floor covering stores and will serve the purpose just as well. The color is not too important because these plates can be painted with white tempera and, with reasonable care, the outline of the design will remain on the surface of the linoleum during the cutting operation. If a small quantity of Karo corn syrup is added to the tempera, chipping of the white coating can be avoided.

Transferring the Design

Several methods of transferring the design are used, but the simplest method is to lay a piece of tracing paper or transparent tissue paper over the subject you wish to copy and



SYMB	REQ	NAME	MATERIAL
A	1	BODY – SHEET METAL	24 GA
B	2	END CAPS	24 GA.
C	2	END BLOCK FOR FLANGE	WOOD
D	2	3/4 FLOOR FLANGE	M I
E	4	3/4 TEES	M I
F	4	3/4 x 8 NIPPLE	M I
G	2	3/4 x 3-3/4 NIPPLE	M I
H	1	3/8 x 8 NIPPLE	M I
I	1	3/4 x 3/8 REDUCING ELL	M I
J	2	14" ROUND DISK BLADE	STEEL
K	1	3/4 x 74 1/8" PIPE	M I

Details of triangular scale model

trace the outline, filling in all solid areas and carefully tracing all detail. When completed, the tracing must be reversed. The outline must be visible from the back of the tracing paper.

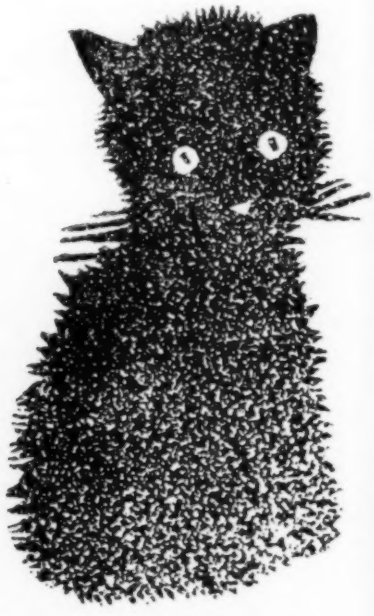
The tracing, with a sheet of soft carbon paper underneath, may be thumbtacked to the linoleum if the design permits, or it may be folded over the edges and glued to the underside of the linoleum. Rubber bands may be used to hold the tracing in place, but these have a tendency to shift, moving the tracing out of register.

For transferring the design to the linoleum, a sheet of soft carbon paper suitable for pencil is required. This can be purchased at any stationery store. Don't try to use the typewriter carbons as they are very hard and the tracing will not be legible. Transferring the design to the linoleum is probably the most important step in the process and it is impossible to expect good results if the transfer is faulty.

The ammonia transfer method may also be employed if the illustration is copied from a newspaper. Cut the illustration from the paper, moisten it with ordinary household ammonia, lay it face down on the unpainted linoleum, and weight it with some heavy object which covers the surface smoothly. Allow the weight to remain in place for at least five minutes, remove, and dry the block. The original image will be reversed on the linoleum plate, ready for engraving.

Fig. 2. Engraving straight lines with a photoengraver's draw tool
Fig. 3. Using the bobby-pin tool
Fig. 4. Outlining with a small veiner

Fig. 1. Combination reverse and positive linoleum cut



(Left) Fig. 5. Benday effect produced with window screen. (Right) Fig. 6. Stipple effect produced with coarse sandpaper

Before cutting the linoleum it will be necessary to decide what kind of a printing plate you intend to make, either a positive or a reverse. A reverse plate is one in which the plate prints as a solid mass of color; therefore, any engraved line will appear white, *i.e.*, without color on the printed sheet. In a positive, the large areas of color are cut away leaving in relief the lines which form the printing surface. Figure 1 is a combination plate. The figures at either end of the telephone line are *reverses* while the line itself is a *positive*.

The linoleum block is primarily a reverse cut which may be compared to a blackboard illustration. Any line cut into its surface will appear white just as though one were to draw a line on the blackboard with chalk. If this idea is kept clearly in mind, the pupil is able to visualize the entire cutting operation. This is the safest way to make a linoleum cut. To make a *positive* it will readily be seen that in order to make a solid black line, two cuts are necessary to make a line stand in relief. All unnecessary surface areas must be removed, either with a gouge or by cutting away entirely those portions of the plate which might smudge the printed sheet. Waste areas should be trimmed from the linoleum plate with a heavy pair of shears to eliminate much unnecessary hand tooling.

Engraving the Plate

The linoleum plate to be engraved should be a perfect square or rectangle. Either shape is quite easy to obtain if the linoleum is scored with a sharp knife point guided by a straightedge. The linoleum is then bent back along the scored line. It will break neatly along this line, and the burlap backing can then be cut with the knife blade or with scissors. Successive cuts can be made in the same manner. The drawhook, shown in Figure 2, is a device which may be purchased from photoengraving supply houses. It is a valuable

Fig. 7. Using a frisket to obtain a 2- or 3-color job from a single linoleum plate

instrument for cutting straight lines, truing up borders, etc.

A useful engraving tool can be made by inserting a bobby pin in an old wood penholder or a ¼-in. wood dowel. Drill a small hole in the end of the holder and force a bobby pin into the hole, allowing approximately ¼-in. of the loop to protrude. A cutting edge should be filed on one side of the rounded end and may be touched up from time to time with a small slip or oilstone. This tool makes a very smooth cut and requires little effort on the part of the artist to engrave circles and curved lines. Figure 3 illustrates the bobby-pin tool in use.

Other special cutting tools may be made from metal ribs from old umbrellas. V-V cutters in varying widths may be constructed by spacing two ribs an equal distance apart by means of brass or copper spacers. By spacing the cutters properly it will be possible to cut lines in the linoleum 1/16, 3/32, or ⅛ in. wide and keep all lines of uniform width. The whole assembly may be clamped together and soldered into a unit if reasonable care is exercised. The steel ribs must be cleaned thoroughly with a file or emery paper before they are joined with solder. Before the tool is sharpened, it may be forced into a suitable wood handle. File cutting edges on the double-V veiner and remove the wire edge by passing a small slip up and down the groove. Linoleum cutting tools must have a perfect edge if good results are desired. A small slip (a wedge-shaped oilstone) is best for keeping the edges in good condition.

After the design is transferred to the plate, the first procedure is to outline the design with a small V-shaped veiner. One of the most skillful operators the writer ever watched held the veiner between the thumb and forefinger, resting the tool in the hollow between these members. By pushing the tool forward in this manner, only a shallow cut will be made, with less danger of gouging the plate and ruining the fine detail. See Figure 4.

After the outline is engraved, best results may be had by resting the gouge in the palm and pushing it forward with firm strokes. The following cautions should be noted: a line cut away can never be restored; only sloping cuts should be made; wide valleys should be cut deep, narrow valleys shallow; never undercut the edges of a line as this method weakens the printing surface.

If, as often happens, the plate is damaged by a slip of the engraving tool as it nears completion, corrections can easily be made if the engraver is using unmounted linoleum. The damaged portion of the plate can be cut cleanly from the area of the plate with a sharp knife and a new segment of linoleum inserted in its place. Scotch tape is sufficiently strong to hold the inserted portion in place. The slight increase in printing height is compensated for by the *give* of the linoleum under pressure of the press. This method makes corrections on finished plates comparatively simple, thereby saving much time and grief occasioned by accidental slips or misinterpretations.

A similar technique may be employed when the engraver wishes to combine words with his illustration. For example, if you wish to draw the familiar type of cartoon in which the speaker's words appear in a balloon above his head, the printer can mortise the block, after the linoleum cut has been properly mounted, and insert printer's type in the mortised area. Such mortises will prove to be a timesaver and also add to the versatility of linoleum printing plates.

If the plate is slightly heated by laying it on a radiator or steam pipe it will cut much more easily, and the danger of chipping is greatly reduced.

Screen Effects

Special screen effects similar to the Benday patterns used by photoengravers can be made by forcing a wire screen into the linoleum cut. Ordinary window or filter screen can be impressed in a warm linoleum plate to form many unusual patterns. A small book press is recommended for this purpose as great pressure is needed to produce good results. The entire printing surface can be treated with the screen. If the engraver decides to screen certain portions of the cut, he should paste proofs of the cut on the screen and cut out these portions with an old pair of scissors. These sections can be registered on the linoleum plate and held in place with paste until impressed in the linoleum. Sand paper and coarse emery paper may be used in the same way to give the finished cut unusual stipple effects. Figures 5 and 6 are examples of screen work.

Two- and three-color effects can be secured from a single plate by using a frisket. This is nothing more than a heavy sheet of kraft paper with certain areas cut out, which serves to mask out unwanted colors. The frisket is glued to the grippers of a platen press or attached to the linoleum cut if it is to be printed by hand. In the event the latter method is used, cut out sections of the proof which are to appear in other colors, ink the plate, and lay the cutouts on the required sections of the plate. The ink has adhesive qualities and will hold the paper cutouts in place during the impression. Additional friskets are required for each separate color. If no printing press is available, excellent results may be obtained by using the bowl of a silver teaspoon. Antique finish paper must be used and should be slightly dampened first. The opportunities for color effects are limited only by the ingenuity of the pupil or instructor. Figure 7 shows the frisket in use on a small printing press. Figure 8 shows a design printed in two colors from a single linoleum plate.

Fig. 8. A two-color print produced from a single linoleum plate by employing a frisket

Printing

Printing linoleum blocks successfully on a platen press requires much skill and perseverance. Linoleum is not rigid like metal printing plates and gives under pressure. To compensate for this *squeeze*, a hard tympan is recommended. The linoleum cut is seldom type-high (.918 in.); all sides must be checked carefully with a type-high gauge if good results are desired. A paper interlay will take care of slight variations in height and make-ready can be relied on to some extent.

Since most linoleum cuts have large printing surfaces (reverses), it will be difficult to strip the printed sheet from the cut if it is printed on a small platen press, the usual shop equipment. It is therefore necessary to add a small amount of *reducer* to the ink to decrease tack. An enamel or gloss-finished paper will give the best printing results. Any ink used on these hard-surfaced papers must dry by evaporation; therefore, the printed sheet must be slipsheeted with newsprint or laid out singly to dry. A small amount of *drier* should also be added to the ink. Both reducer and drier may be purchased from ink manufacturers and can be used with black ink or colors.

For production jobs on Christmas cards, book plates, monogrammed stationery, etc., requiring short runs from as many as 200 separate cuts, lock up a block of wood (which has been planed to the proper height) in the printing press form and tack the individual plates successively to the block. Carpet tacks will hold the linoleum firmly, and if sufficient care is taken, the plates can be registered close enough for ordinary purposes by drawing guide lines on the block with a red pencil. The paper can be fed to the same guides for all cuts. There are several new cements on the market for mounting linoleum cuts if permanence is desired.

TIN DOG

WILLIAM LEE HODGE
Graduate Assistant
Illinois State Normal University
Normal, Ill.

The dog shown in Figure 1 is an excellent tin-snips project for the beginner. It may be used as a knickknack, and if weighted, can be used as a paperweight or as a toy for children.

Fig. 1. A tin-snip project

Material

Tin, No. 2 tin can, or light aluminum.

Procedure

Step 1. On ½-in. squared paper, make a drawing of the dog as shown in Figure 2.

Step 2. Obtain a 6½ by 4½-in. piece of light tin from a No. 2 or larger tin can.

Step 3. Using carbon paper, trace the design on the tin plate.

Step 4. Scribe all lines except those that are dotted.

Step 5. Cut out the body with tin snips.

Step 6. File the edges to remove burrs and sharp points.

Step 7. Use steel wool to clean the dog before painting.

Step 8. Bend the body to shape.

Step 9. Tin the nose and solder in place.

Step 10. Paint the surface in black and white or as desired.

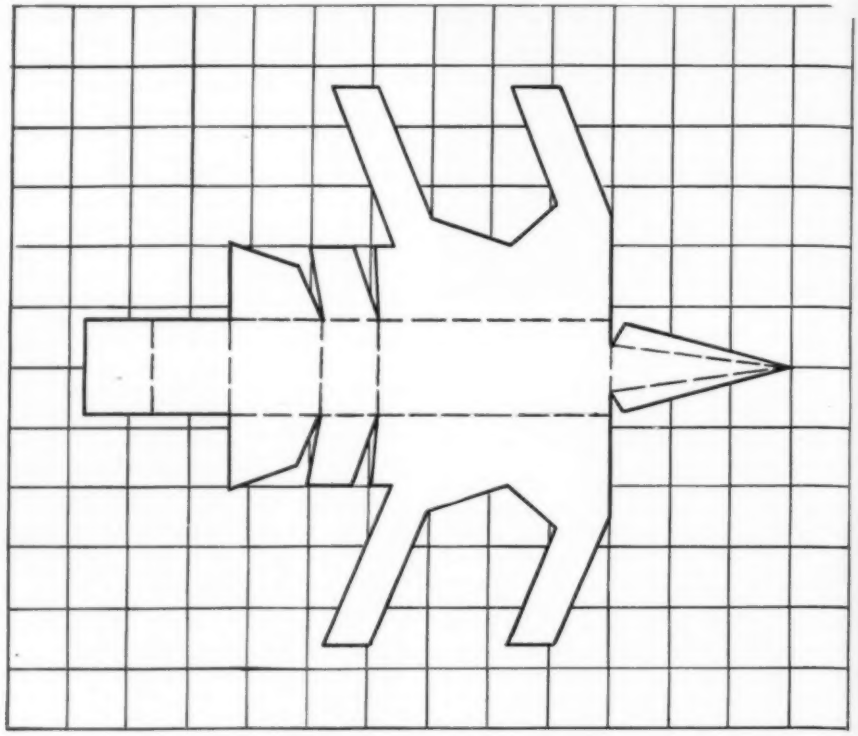


Fig. 2. Pattern for tin dog

ROOF FRAMING JIG

MARY ANN CALLAN
Frank Wiggins Trade School
Los Angeles, Calif.

Frank Wiggins Trade School carpentry teacher, Ralph W. Lee, has constructed a teaching device known as the rafter framing jig which permits the measuring of rafters for roof framing to be done accurately on a scale suitable for classroom work.

The rise measurements are contained on an upright member in which an indicator slides in a vertical plane. The entire jig slides in a horizontal plane by means of a dovetail fastened to the top of the blackboard. The seat cut of the rafter rests upon a stationary 1 by 4-in. plate.

With the use of this teaching device, students can practice full-size rafter framing and ascertain the desired length of rafters for practically all roof pitches.

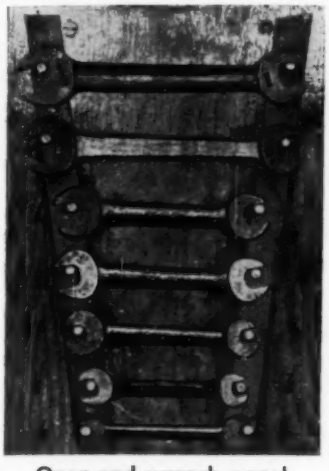
Roof framing jig devised by Ralph W. Lee, instructor of carpentry. Photography by Young, Baker, and Salicudo of the Wiggins photography class

This jig has been found of great assistance in instructing carpentry students.

DRESSING UP THE TOOL ROOM

A. G. LAMBERT
Thomas A. Edison Vocational
High School
Baltimore, Md.

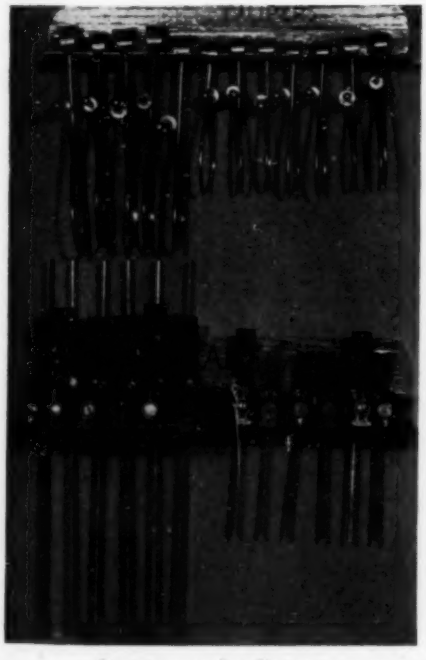
The blocks referred to in an article bearing the title "Dressing up the Toolroom," on page 438 of the December, 1947, issue of this magazine, may be made to accommodate a variety of differently shaped tools, but they



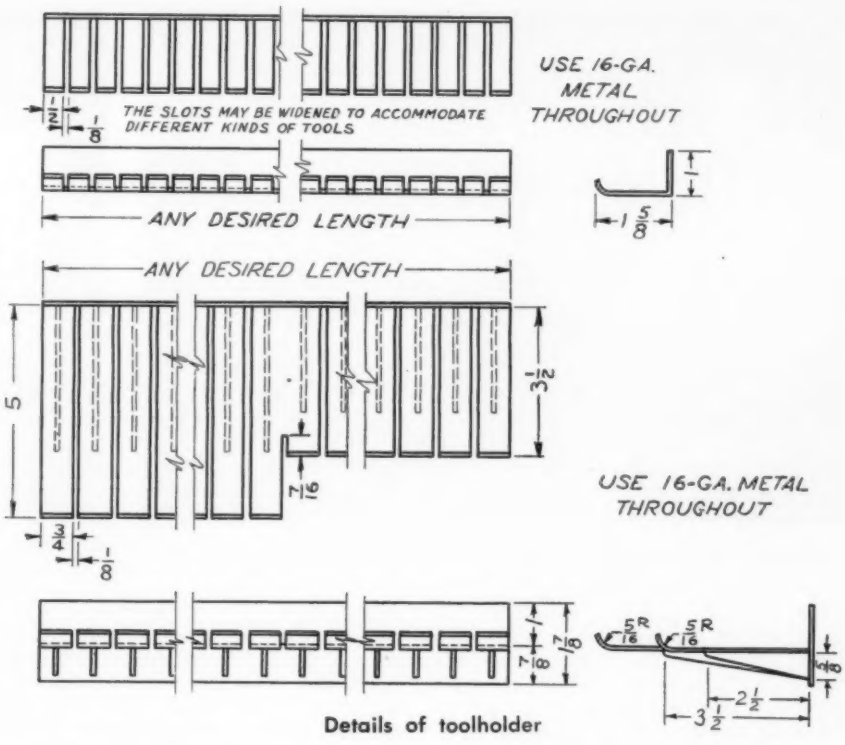
Open-end wrench panel

are not a *cure-all*. They could not be used for such tools as calipers, dividers, squares, open-end wrenches, etc. This article deals with holders for these tools.

The making of the various toolholding devices involves many basic benchwork operations, such as shearing, squaring, layout, hack



Squares and calipers

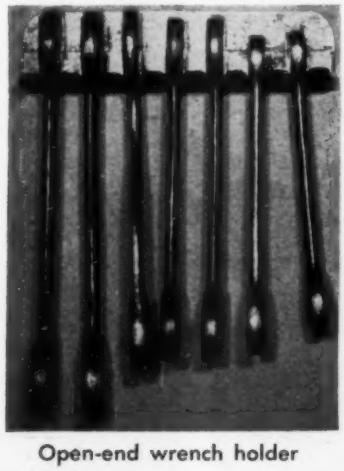

USE 16-GA. METAL THROUGHOUT
THE SLOTS MAY BE WIDENED TO ACCOMMODATE DIFFERENT KINDS OF TOOLS
ANY DESIRED LENGTH
ANY DESIRED LENGTH
USE 16-GA. METAL THROUGHOUT

Details of toolholder

sawing, filing, drilling, bending, etc. It is suggested that these devices be worked into the course of study for beginning students, as *benchwork* projects. The interest of the students is always high in doing something meaningful.

The same type of holder that is used for dividers may be varied to accommodate other tools by varying the dimensions and enlarging the slots. The front is bent up slightly to keep the tools from falling out.

The same principle was used in making the holder for the squares but after the slots were



Open-end wrench holder

cut the resulting arms were too weak to support the tools. The students carried the project on to their welding class where they welded small pieces of 16-ga. metal, edgewise, under each support.

Notice that each holder is fastened to a piece of hardwood which bears the name of the tools. The assembly is held in place with two screws which allows the tools to be shifted as desired with very little damage to the toolroom panels.

The drawings and pictures show the application of the holders and need no further explanation.

TECHNICIANS UNLIMITED

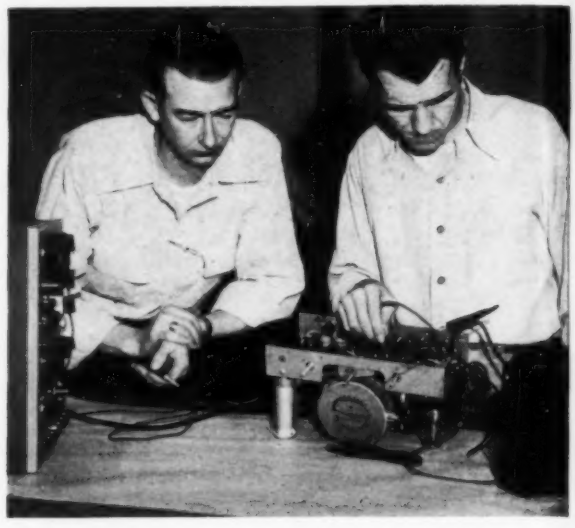
M. L. TAYLOR
Columbia, Mo.

During the war thousands of young men dropped out of high school. Most went into service; the younger ones took war plant jobs. Many left school because they had little aptitude or interest in academic subjects. In the service or in the factories they developed an interest in mechanics. At the end of the war, however, they faced a dilemma.

Bright and ambitious, these men did not want to be bogged down in unskilled factory jobs. Still they felt too old to go back to high school and even more unsuited to go to college. The veterans were more fortunate than the others. They could go to private trade schools or get on-the-job training on the G.I. Bill. War plant pay checks, however, often went as quickly as they came, or savings were eaten up by postwar inflation. State universities offered college training tuition-free, but the number of public institutions offering vocational training on the same basis was too small to meet the demand.

The University of Missouri has started an

Part of the air-conditioning course consists of studying fans. Other electrical equipment is also studied



Two aspiring radio repairmen are servicing an a.m. receiver

intensive vocational program designed to fill the needs of these men. It has two divisions now in its second year: one in radio and electronics, the other in heating, air conditioning, and refrigeration. The eight-month course is tuition-free to residents of the state; a similar course in a private trade school would cost about $600. Students are given practical, realistic training for jobs as radio repairmen, broadcast engineers, workers in industrial radio, and servicemen for deep freeze and cooling systems.

Carrying no university credit, the course is designed solely to give the men a thorough, up-to-date grounding in technical work. Students take an intensive ten-week course in basic theory of electricity and machines. They also learn such shop mathematics as they need for making actual computations. The rest of the time is spent in making and testing equipment, presenting problems similar to those which they will encounter in actual service work.

The program is based on the realization of a need for skilled technicians to keep up with the fast pace of engineering achievement. At one time the only difference between the engineer and the unskilled workman was that the engineer could do sums in his head. Now that engineering has gone more and more into theory the space between the two has widened tremendously. Missouri's object is to train technicians to fill in the gap and carry out engineering advances.

Earl Colley, radio and electronics instructor, is an ardent advocate of offering more such courses in public institutions. He himself is a product of vocational education; his patent papers serve as his college degree in teaching. He is coinventor of a photoelectric control designed during the war to keep machines from breaking tools. He feels that the sometimes prohibitive cost of private trade school training keeps many out of fields where they are urgently needed.

Jobs for trainees are one of the principal goals of the Missouri program. All but one of last year's graduates are now working in

The course was originally training for appliance dealers. The shop is still open for spare-time jobs of students

jobs which they obtained before leaving the school. Dr. Frederick G. Bender, professor of the heating, air-conditioning, and refrigeration course, keeps in touch with the major air conditioning and refrigeration companies in Kansas City and St. Louis.

Radio students make their own sets, first a one-tube, then a super heterodyne. They receive a thorough and practical grounding in experiment and theory of all phases of amplitude modulation. After that they take up frequency modulation, television, and ultra-high frequency work. They do trouble shooting, finding and repairing actual difficulties duplicated in their sets. A good many students are working toward their first-class radio-telephone permits to become broadcast engineers. They study F.C.C. radio regulations. The shop has one big transmitter with which students get experience in adjustment and maintenance of a large commerical transmitter.

Students planning jobs in industry experiment with photoelectric cells. The original model of Mr. Colley's patent control is in the Missouri laboratory. For further industrial work they take up radio-frequency induction heating and its application to industrial processes.

Students in the other half of the course are trained to service all types of domestic refrigeration, principally cooling systems and deep freezing. The program is built on plan views of a one-story house of five or six rooms and a basement. With a gravity and warm-air furnace they built themselves they determine correct heating methods; for air conditioning they compute sizes of fans and equipment needed to attain various temperatures.

Modern developments in both halves of the program are studied as fast as they come up. The Missouri program makes a point of giving at least fundamental training to their men to enable them to use the latest short cuts and service the newest equipment.

With more and more men taking advantage of college engineering courses, the need for trained technicians to carry out engineering developments will increase. President Truman, in his State of the Union address to Congress, stressed the necessity for equal educational opportunity to all. The University of Missouri is trying both to furnish this opportunity and to fill an increasing demand.

BREAKFAST-NOOK TABLE

R. E. MURRAY

Co-ordinator, Trades Department
Public Schools
Fremont, Ohio

Due to a limited amount of space available after renovating a kitchen or breakfast nook, one may use a discarded drop-leaf table by altering it in the manner shown in Figures 1 and 2.

Remove the slides from the underside of the top before making the parting saw cut. Leave one of the drop leaves intact.

Fitting the table to the wall may be done in several ways as shown in Figure 2.

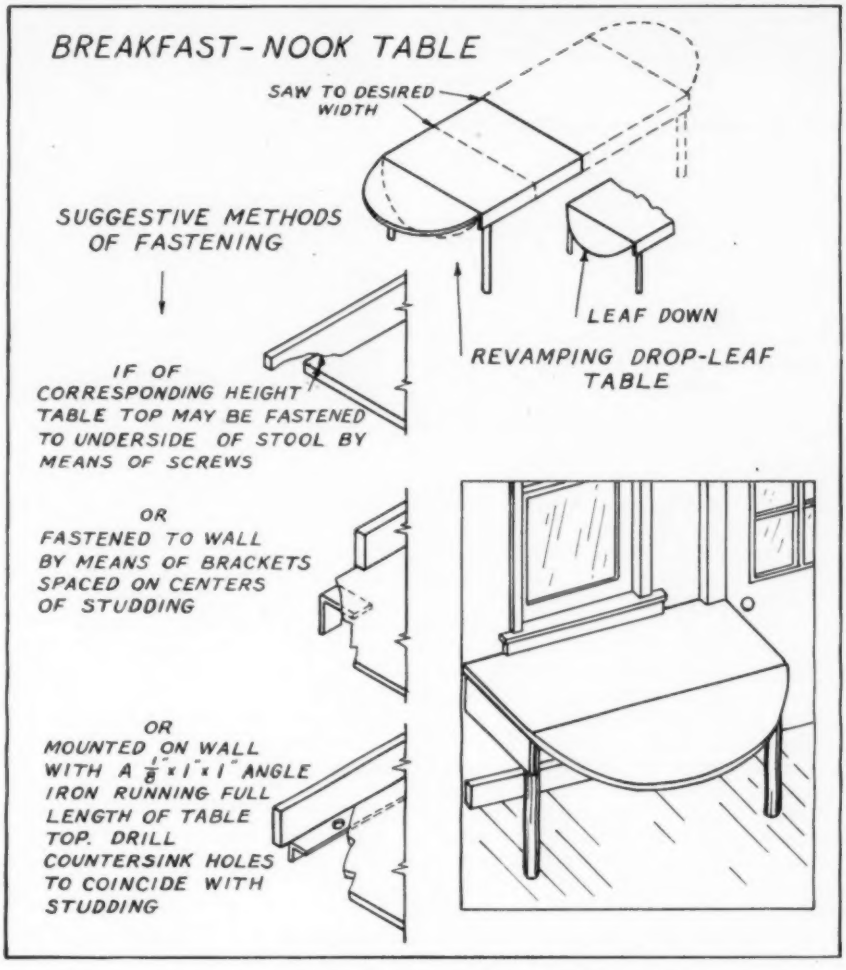

BREAKFAST-NOOK TABLE
SAW TO DESIRED WIDTH
SUGGESTIVE METHODS OF FASTENING
LEAF DOWN
REVAMPING DROP-LEAF TABLE
IF OF CORRESPONDING HEIGHT TABLE TOP MAY BE FASTENED TO UNDERSIDE OF STOOL BY MEANS OF SCREWS
OR
FASTENED TO WALL BY MEANS OF BRACKETS SPACED ON CENTERS OF STUDDING
OR
MOUNTED ON WALL WITH A 1/8" x 1" x 1" ANGLE IRON RUNNING FULL LENGTH OF TABLE TOP. DRILL COUNTERSINK HOLES TO COINCIDE WITH STUDDING

Fig. 2. Suggestions for revamping drop-leaf table

Fig. 1. Breakfast-nook table

A UNIQUE COPY DESK

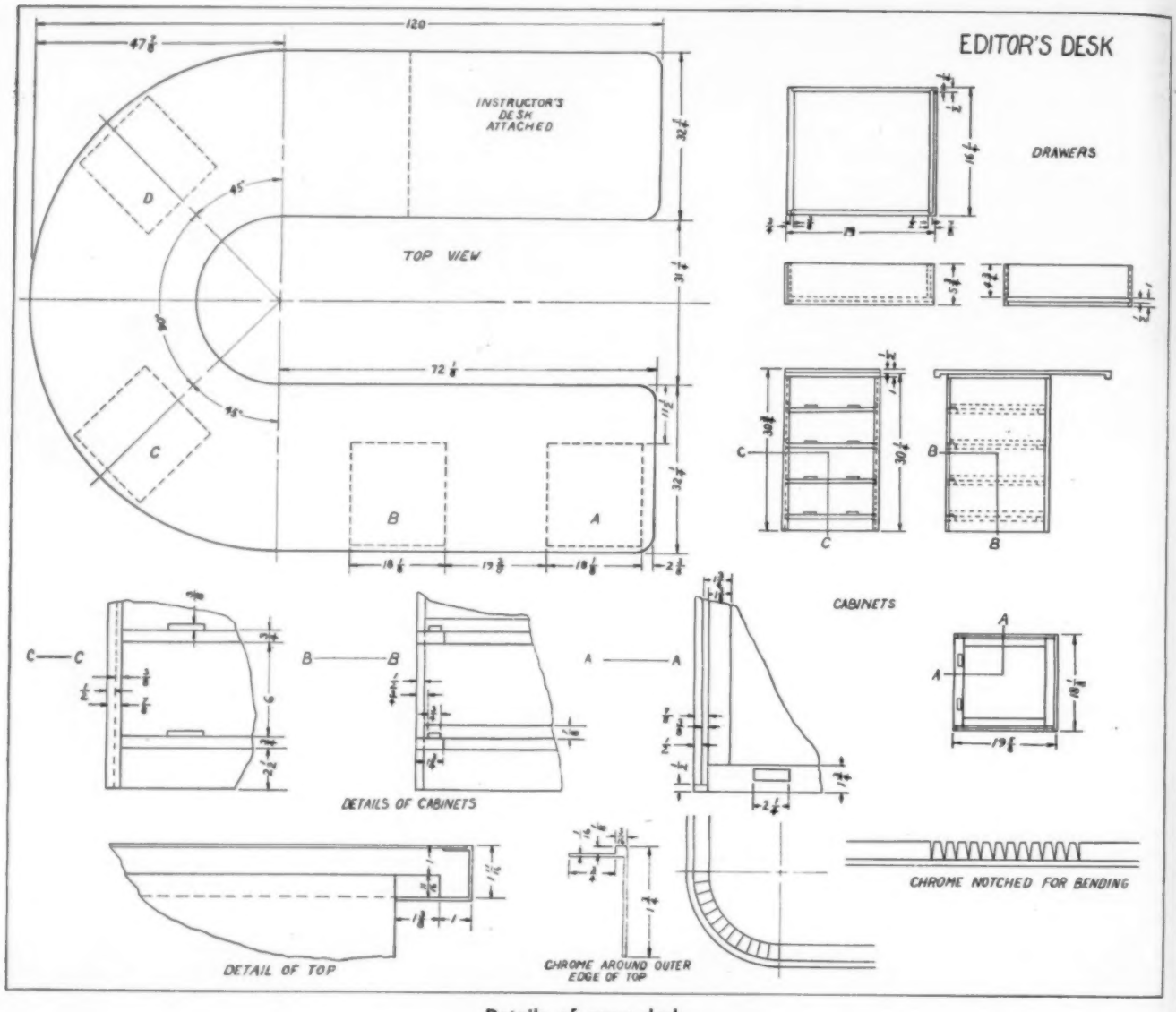
DON R. McMAHILL

Omaha Technical High School
Omaha, Neb.

With an intensified public-relations program bringing increased school visitations, most of the shop equipment at Omaha Technical High School recently has been scrubbed and painted in color designs so brilliant that ordinary classroom teachers gasped. Among the envious was the writer — director of school publications and current chairman of public relations. It just didn't seem right that our newsroom should look so dingy alongside a wealth of vocational shop equipment.

What the newsroom lacked was a modern, streamlined copy desk in the horseshoe design so popular in daily newspaper plants. Investigation revealed that even near-by universities afforded nothing worth duplicating. Campus editors, like those in the high schools, seem never to get far enough ahead of the deadlines to crusade for better equipment in their production rooms. Cast-off desks, chairs, files, to say nothing of old lamps and typewriters, seem to be standard for most school publication headquarters. But the glowing example set by the shopmen in our school made it imperative that the *Tech News* office be brought up to date at once.

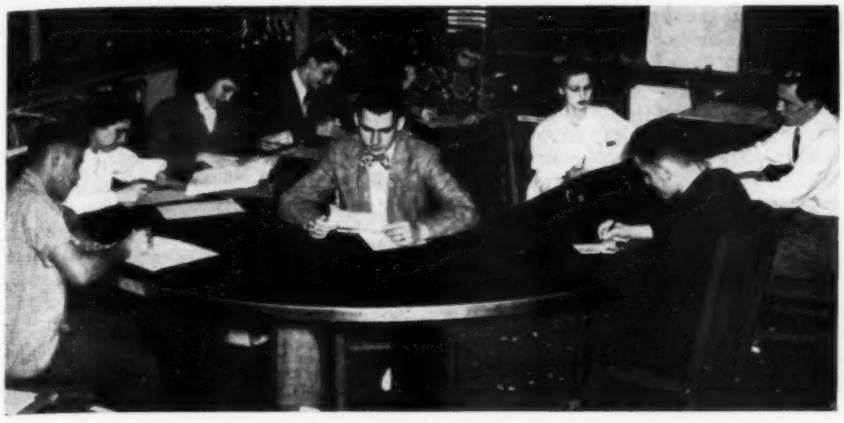
Mechanical drawing students were invited to submit patterns for a horseshoe desk. Once the general design and final placement were established, a rough drawing was handed to



Details of copy desk

the chief of our woodworking department. Perhaps we are more than lucky in having Robert Galt heading up that section. A cabinetmaker from Scotland of the so-called "old school," he is celebrating his eightieth birthday at the time this is published — and he has not lost one fraction of that original zest for perfection for which early cabinetmakers are so famed. Mr. Galt took our rough sketch, and with a crew of advanced woodworking boys paid a visit to the City Room of the Omaha *World-Herald*. Again we were fortunate. Three graduates of the school were more than glad to take time off from their reporting duties and explain every detail of their equipment. The *World-Herald*, incidentally, has just moved into its own streamlined, new plant. It is doubtful that our crew of observers could have located a finer copy desk elsewhere in the world! Tape measures came out, drawings were made, and even minor objections

The copy desk assembled



The copy desk in use

and recommendations for improvement were noted.

During the next few days, interest in the creation of a revised drawing ran high. It is one thing to work at textbook designs — and quite something else to produce an accurate working plan under pressure, as our advanced boys in mechanical drawing soon learned! When his estimate of materials was made, staff members of the *Tech News* also discovered that even dreams are expensive. A drive for funds opened immediately, and within one week an all-school dance netted sufficient income for materials.

Contrary to Hollywood concepts, today's newspaper offices are not primarily cluttered with papers, photographs, mats, and other journalistic aids. Businesslike in every detail, the modern City Room must have plenty of drawer space, and that became an outstanding feature of the new desk. To add to efficiency and orderliness, each drawer is to be tabbed. That brought about a separate project for boys in sheet metal. Aluminum holders, similar to those commonly used on filing cabinet drawers, are now being installed. Other hardware, with minor exceptions, was made in the school shops.

Since the instructor's desk is a vital part of school newspaper production, it was incorporated into the plans for the horseshoe. The desk top was first removed, then installed with removable braces, rather than glued, for a very good reason! Like the man who built a boat in his basement and then could not take it outside through the cellar door, we almost constructed a king-sized desk that would defy moving into or out of the present room. Should such a move now become necessary, the entire top, including that of the instructor's desk, can be unscrewed. The sections of drawers that also serve as sturdy supports, or legs, may also be moved individually. All parts, of course, are screwed tightly in place during normal operations.

Still another shop department was called in when staff members decided that the project should be carefully sanded and stained green. Boys in general shop, those who are not so advanced as those in vocational work, came in and undertook much of this finishing. And when the battleship linoleum was waxed, even the custodial staff brought in the large power buffer that keeps the hallways sparkling!

The present picture made by this desk is quite attractive. It is strategically located so that it can be seen easily by all who pass by. The green linoleum top, stained green drawers, aluminum fittings, and chromium edging, flash an invitation that is difficult to resist.

Correlation of effort has not yet ended. A strong campaign for fluorescent ceiling lights is destined to bring students from electricity classes into the program. Gentle pressure exerted upon responsible authorities may result in a complete redecoration job for the room. Window washing has been more frequent, and custodial dusting seems to be more thoroughly done.

During the latest parent visitation, we were proud of our news room and its magnificent copy desk. Somehow, beyond mere self-satisfaction, we were glad that the project gave us an opportunity to prove what correlation can achieve. There is now a much higher degree of mutual respect between those who take journalism as a college preparatory subject, and those who sign up for vocations — to earn a living, while learning.

At least, every student who assisted had the pleasure of seeing his name in the paper, along with a picture of the horseshoe copy desk he had helped to build.

The design, as here presented, is not patented, so why not show it to the journalism instructor in your school?

THE OXYACETYLENE WELDING AND CUTTING PROCESS

J. I. Banash

Consulting Engineer
Chicago, Ill.

(*Courtesy of International Acetylene Association, 30 East 42 St., New York 17, N. Y.*)

The modern metalworking industry considers the oxyacetylene process a most valuable and acceptable metalworking tool in fabrication, demolition, and repair.

The basic equipment for oxyacetylene welding and cutting is acetylene and oxygen, and certain relatively simple but fairly precise apparatus.

Principles of Oxyacetylene Processes

Oxygen and acetylene are combined in suitable apparatus to give the oxyacetylene flame, with its extremely hot flame temperature. This can either rapidly heat or melt any metal so that a welded joint may be made. Iron or steel may be cut rapidly by a jet of pure oxygen impinged on the place that has been heated to its ignition point. This ignition point is below the melting point of the metal, and the stream of oxygen oxidizes the metal. The process can cut or shape iron or steel as desired and under close control.

The oxyacetylene flame for heating or welding may be produced in three types by the same blowpipe, depending on the ratio of the volume of oxygen and acetylene supplied. A neutral flame is obtained by a mixture of approximately equal parts of oxygen and acetylene. This flame is used where it is desired to have no chemical or metallurgical effect on the welded metal. The flame is held in a suitable manner with the inner cone not quite touching the metal. When additional acetylene is supplied to the flame, a so-called *carbonizing* flame is developed. A neutral flame has a distinct inner cone and an outer envelope. The excess-acetylene flame has a third zone between the inner and outer envelope, known as the excess-acetylene feather. This consists of incandescent carbon particles, some of which are dissolved in the molten metal during welding. For this reason, the flame is frequently called a *carburizing* flame. Such a flame will tend to remove oxygen from iron oxides which may be present. The third type of flame adjustment has an excess of oxygen. This is called an *oxidizing* flame because of its effect on the molten metal.

When acetylene is completely burned in ordinary air, the oxygen in the air combines with the acetylene to form carbon dioxide and water vapor. Combustion of the acetylene requires two and a half times as much oxygen as acetylene. All this oxygen does not come from the supply of pure oxygen. Actually about 40 per cent comes through the blowpipe. The rest of the combustion is completed with the oxygen of the air in the flame envelopes surrounding the inner cone.

Gases

Acetylene — Acetylene is generated from calcium carbide, a grayish rocklike substance with the peculiar property of producing acetylene when it comes in contact with water.

Acetylene is produced in acetylene generators, which usually consist of a cylindrical tank of water supporting a carbide hopper, with a feed mechanism mounted between the two. This mechanism may be controlled by the volume of acetylene or the pressure within the generator. Interlocking connections and vents produce the necessary safeguards in handling this combustible gas. Pressure of free acetylene is limited by general rules to 15 lb.

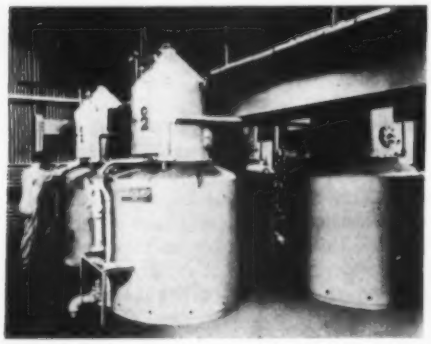


Fig. 1. Acetylene generators

per sq. in. gauge pressure. Acetylene generators are either portable or stationary.

When acetylene generators are not available or desirable, acetylene may be obtained compressed into cylinders which have also become a standard article of commerce. An acetylene cylinder does not contain free gas, but is completely filled with a porous material. These fine pores are then filled with acetone which has the peculiar property of dissolving many times its own volume of acetylene for each 15 lb. pressure. Under these conditions, higher pressures are permissible since the acetylene is not in the free gaseous state. Thus it is possible to supply some 300 cu. ft. of acetylene under a pressure of 250 lb. per sq. in. in such a shipping container. When acetylene is needed in great quantities, it is generally supplied by acetylene generators and is piped throughout the plant to convenient outlets at the various points where it is used. In some instances, acetylene cylinders are manifolded and connected to such pipe lines.

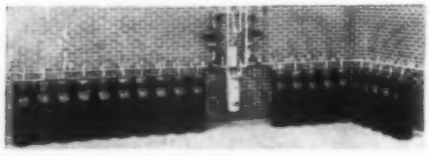


Fig. 2. Manifolded acetylene cylinders

Acetylene as a chemical is a most interesting product. It has a peculiarly distinctive odor so that small leaks can readily be detected. It consists of carbon and hydrogen, with the formula C_2H_2. When burned with oxygen, it produces carbon dioxide and water vapor with a great heat because of its endothermic property. When the flame burns in air with a suitable burner, it is a close approach to sunlight, and colors may be matched in such a light.

In addition to the oxyacetylene process, acetylene has a tremendous use in the production of chemicals. It is also used for lighting marine signal buoys and still, to some extent, for farm lighting.

Oxygen — Oxygen is most commonly produced by fractional distillation of liquid air which separates out the main components of the air: oxygen and nitrogen. The oxygen is compressed into the familiar high-pressure cylinders for distribution to the user. This sounds simple, but the procedure is highly technical.

The oxygen supplied for welding and cutting has a purity of 99.5 per cent. This same oxygen is used by our hospitals for oxygen therapy, and is a most vital material. One can live for a month without food, nearly a week without water, but not over five to eight minutes without oxygen.

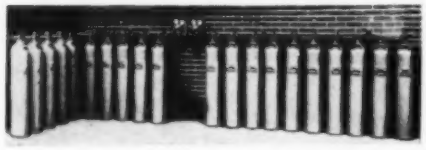


Fig. 3. Manifolded oxygen cylinders

When large volumes of oxygen are needed, it is piped throughout the plant from a central supply source to convenient outlets. Oxygen cylinders may also be manifolded together and connected to a pipe line. During the last war, tremendous volumes of oxygen were needed to meet immediate demands by the war industries. All this volume could not have been supplied with the usual cylinders. Therefore, various specialized methods of distributing oxygen in large volumes have been developed and successfully applied.

Equipment

One of the factors which contributed greatly to the growth of the oxyacetylene processes has been its simple and inexpensive equipment. In its simplest form, a welding and cutting outfit consists of a cylinder of oxygen, a cylinder of acetylene, two regulators, two lengths of hose, a welding blowpipe, and either a cutting attachment or a separate cutting blowpipe. With such an assembly, practically all commercial metals can be welded, and steel, wrought iron, and cast iron can be cut.

Blowpipes — The blowpipes are precision-built with proper control valves so that the desired proportions of acetylene and oxygen may flow and become thoroughly mixed before issuing from the tip. The usual welding torch has a single orifice. Entirely different tips and controls are used for cutting metals. A number of orifices for the mixed gases surround a central orifice, through which the pure oxygen issues to accomplish the cutting. With the flames surrounding the cutting jet, the cut can proceed in any desired direction without changing the position of the nozzle.

Regulators — It seems obvious that one cannot and should not use 2200 lb. per sq. in. of oxygen, and 250 lb. per sq. in. of acetylene in any piece of apparatus. This high pressure is used in shipment and is not intended for use at the application point where the pressures are less than 15 lb. per sq. in. for acetylene, and less than 100 lb. per sq. in. for oxygen. To obtain precise work, the pressure should not vary. This is accomplished by reducing valves or regulators, so that suitable working pressure is under the control of the operator. These devices are also simple, but precision is, of course, needed in their manufacture and assembly to produce the accuracy needed to maintain efficient flames.

Fig. 4. A complete portable outfit for oxyacetylene welding and cutting

Applications

Oxyacetylene Welding—Oxyacetylene fusion welding is most simply accomplished by bringing two pieces of metal in contact and melting them under an oxyacetylene flame. The molten metal flows until each edge is completely fused with the other. Additional weld metal is generally introduced into the joint by a welding rod which is melted in the same flame. The edges of all but very thin sections should be beveled to obtain complete fusion to the bottom of the weld. Thus strong ductile joints are obtained with practically any thickness of material. Oxyacetylene welding is most readily used in automatic or semiautomatic machine operations, and is extensively used in the manufacture of steel tubing, barrels, drums, and tanks.

Fig. 5. Oxyacetylene bronze welding

When it is not desirable actually to melt the parent metal, a sound joint may be produced by brazing or bronze-welding. This is done by heating the edges of a joint to a dull red heat and then melting a bronze welding rod in the hot metal. At this temperature the rod will combine with the base metal and form a strong bond. A bronze-welded joint is quite comparable to a fusion weld in many ways. The main advantage is that a lower temperature can be used which is somewhat easier and faster.

In wrought iron, there is a mixture of high purity iron and a slag of iron oxides and silicates. These materials are rather uniformly distributed and in the rolling process are stretched out into so-called threads or fibers. In general, wrought iron requires more heat in welding than ordinary steel because of its higher melting point. A somewhat larger welding tip or nozzle may be used. The welding operator becomes familiar with the appearance of the weld as it is being welded so that he can tell when and how fast to proceed. With wrought iron there should be as little agitation or puddling as possible. The welding rod is usually of good quality without high-carbon or high-alloy additions.

When high-carbon steel is welded, the operator must consider properties developed in the base metal by the original special heat treatment. As with any heat-treated steel, the welding temperature will locally destroy the properties gained by the heat treatment. These properties are usually restored by proper heat treatment after welding, which sometimes may be a rather complicated procedure. When high-carbon steel parts are welded, it is quite desirable to preheat them just enough to obtain proper fusion. Overheating shoud be avoided. When relatively thin parts are welded, there will be considerable intermingling of the base metal and the metal from the welding rod. A relatively low-carbon rod can be used, with certain alloy additions to improve its physical properties. When heavy sections or other parts are to be heat-treated subsequently for increased hardness and strength, high-carbon rod should be used. This description is very brief and could be elaborated in great detail, but such information is beyond the scope of this paper. However, if anyone is interested in more detail, he can get it readily from available sources.

Cast iron can be fusion welded or bronze-welded. The latter procedure is usually desirable because it can be done at a lower temperature and gives increased ductility in the weld metal. Fusion welding is needed, if the color of the weld must match the base metal, as in reclaiming defective gray iron castings at the foundry. It is also needed if the welded part is to be subjected in service to temperatures much over 500 deg. F., as bronze loses strength rapidly at high temperatures.

Malleable iron can also be welded satisfactorily by bronze-welding. With malleable iron, fusion welding would not generally be satisfactory, because the heat of fusion would destroy the malleable properties, and thus lengthy heat treatments would be necessary to restore the iron to its original condition. Such treatment is not warranted with malleable iron because of its cost. The low temperature of bronze-welding makes it rather simple to weld such castings without imparing the malleability.

Nonferrous metals — Practically all nonferrous metals and alloys can be welded with the oxyacetylene process. Certain technical details should be observed. For instance, the operator should know that aluminum collapses suddenly upon reaching the melting point without any visible color change. Also aluminum and many of its alloys are weak when hot, a so-called *hot-short* condition. Therefore, during welding, areas that are to be raised to the welding temperature must be adequately supported. Furthermore, when aluminum is exposed to the atmosphere, an oxide forms rapidly on the surface. This must be removed before a sound weld can be made. The surface must be properly cleaned before welding, either mechanically or chemically. During the welding a flux must be used to protect the weld from the atmosphere.

During welding, heat is dissipated more rapidly in copper than in steel, because the copper has good heat conductivity. Although copper has a lower melting point than steel, more heat is necessary to make a weld. This may be accomplished by preheating the base metal. A larger tip or head is generally used for copper than for a similar thickness of steel. There are two types of copper: ordinary electrolytic copper which contains oxygen in the form of cuprous oxide; and eutectic mixture of copper and cuprous oxide which may act to reduce the strength of the weld as much as 60 per cent. What is known as deoxidized copper is available commercially in the form of rods, tubes, sheets, and plates. This should be used wherever possible since it is free from oxides and thus eliminates the difficulty just described. A welding rod of deoxidized copper should be used. A flux is generally not required.

Flame-Hardening — Flame-hardening is another process made possible by high temperatures and rapid rate of heat transfer. Surfaces of a quench-hardening ferrous material can be heated above its critical temperature by oxyacetylene flames. It is then cooled by a suitable quenching medium, usually water. This results in a hardened case without change in the composition. A hardened case of any reasonable depth and contour can be produced, and confined to those areas where hardness is necessary, leaving the rest of the metal in its ductile condition. This result is extremely difficult to obtain by any other heat-treating method.

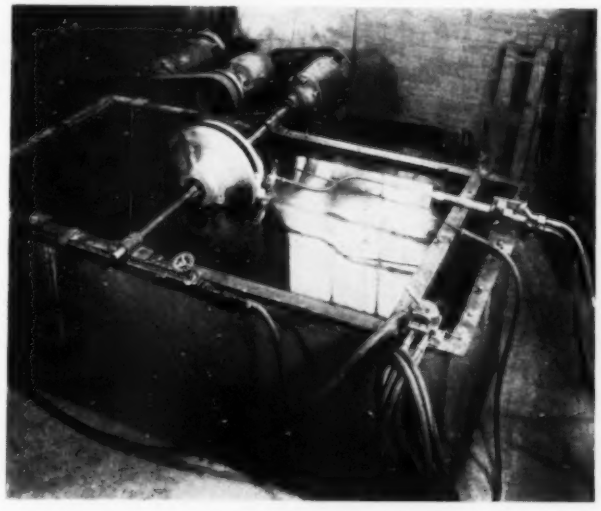


Fig. 6. Flame-hardening

Flame-Softening — Flame-softening by the oxyacetylene flame may also be used to reduce locally the hardness of a metal surface. This

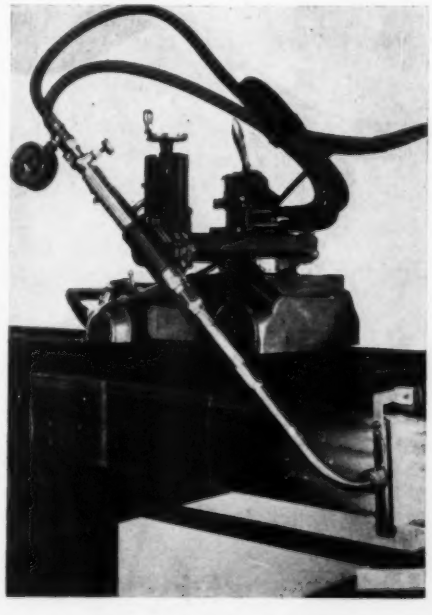


Fig. 7. Flame-softening

process is often used to soften the cut edges of hardenable steels, for the local softening of final electric arc weld passes, and also for softening flame-cut risers on steel castings to facilitate subsequent machining. Application of this technique is somewhat similar to that of flame-hardening except that the steel surface is not quenched and the resultant slow cooling gives the desired annealing effect.

Flame-Priming — Steel surfaces can be readily flame-primed by high-velocity oxyacetylene flames prior to painting. The rapid heat and scrubbing action of the flames remove all

Fig. 8. Flame-priming

the mill scale, rust, and surface moisture from the steel. This makes the paint go on faster, stick with a tighter bond, and last longer. Furthermore, flame-priming warms the surface prior to painting which allows a satisfactory coat of paint to be applied even in bad weather conditions. This application has been extensively used on structural steel surfaces requiring protection such as bridges, dams, gates, and water tanks.

The oxyacetylene process can be applied in a great variety of ways, such as bending, straightening, and forming various steel and other metal sections. For example, the wrinkle-bending of pipe is an economical operation and does not reduce the internal diameter or wall thickness of the bent section. Metal tubing can be quickly end-formed to eliminate deep drawing and other operations. The ends of tubes can be readily closed to make tops or bottoms of containers by a flame-spinning process. In this process, the tube is usually held horizontally on a rapidly spinning chuck of a lathe. The oxyacetylene flames rapidly heat the working end. A forming tool of proper shape is forced in by hand and causes the end of the tube to collapse into the proper shape or seals it off completely. During the war, this latter operation converted numerous lengths of tubing into closed containers without the necessity of forming dies, punch press work, and joining the ends of the tubing.

Pressure Welding — In recent years, a somewhat different method of welding has been introduced. This weld is made by pressing together the clean, square faces of two sections to be welded under moderate pressure and then heating the joint by oxyacetylene flames to a plastic stage ranging from 2100 to 2400 deg. F. The pressure causes the parts to unite before the ends become molten. Of course the completed joint has a definite bulge or upset. This has proved to be an economical method for joining large-diameter overland pipe lines, as well as small-diameter pipes for industrial installations. It is being used by railroads to produce solid rails hundreds of feet in length.

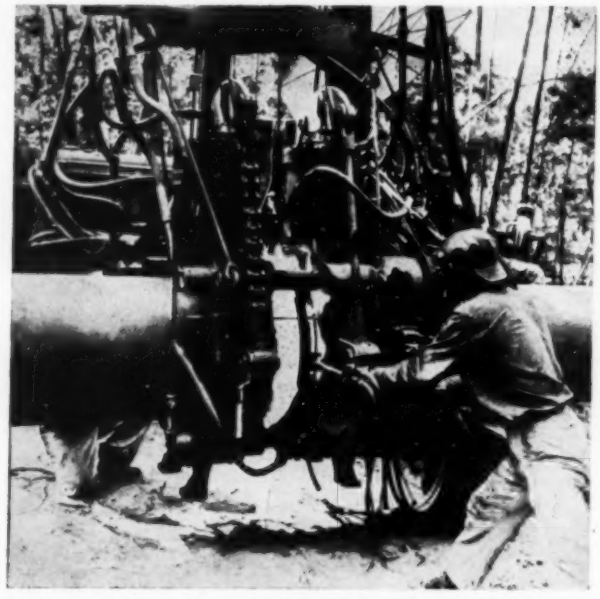


Fig. 9. Pressure welding 24-in. pipe for overland pipe line

Oxyacetylene Cutting — By far the greatest proportion of oxygen in this country is used for cutting iron and steel. In this application, the surface of the metal is raised to the ignition temperature by oxyacetylene preheating flames which surround the central orifice of the cutting nozzle. Through this orifice a jet of pure oxygen, controlled by a separate valve, is directed at the heated area. This operation actually starts at a temperature below the melting point of the steel, and results in such rapid oxidation of the material in the path of the oxygen stream that a cut is made. Iron oxide is formed. This oxidation of the iron produces additional heat which tends to help melt the material adjacent to the reaction zone. The blowpipe tip may be moved in any predetermined direction. A combination of oxidation, melting, and erosion removes the material in its path. With proper skill, a fairly precise cut can be made, with relatively narrow kerf which cuts down the waste of material. Only the ferrous metals may be cut in this manner. This represents the major tonnage of metal in this country.

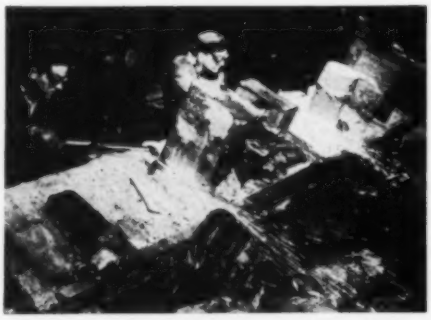


Fig. 10. Manual oxyacetylene cutting of risers

The hand-cutting blowpipe is familiar to many people who have no direct contact with the oxyacetylene industry. Cutting apparatus is almost universally carried by such organizations as fire departments and wrecking and rescue crews.

As in welding, various types of machines are used to carry and guide the blowpipe so that accurate and high-quality cuts may be obtained. These cutting machines may be small portable devices electrically driven, or large machines guided by remote control. A machine may cut straight lines, circles, or irregular shapes. Single pieces may be cut or many parts simultaneously, depending on the setup. Such machines are used extensively in shipyards and steel fabricating shops for cutting plates to the desired shape and for squaring and beveling plates preparatory to welding.

Shape-cutting machines have been developed and are in constant use for cutting plate or sheet to any desired shape. After the operator adjusts the flames, he follows a pattern on a drawing or templet. Through a pantograph or similar arrangement, the blowpipes follow the same pattern at the point of application. Single pieces or several pieces of the same shape may be cut from a steel plate at the same time. Plates up to 24 in. in thickness have been shape-cut, and steel up to 5 ft. in thickness has been cut in straight-line work. The ac-

Fig. 11. Portable cutting machine

curacy obtained is surprisingly good and minimizes the final amount of machining. When parts are cut from thin plate, production can be increased by stacking a number of plates together and making a single cut or multiple cuts through the stack as if through a solid material. Such stack cutting has made practical the cutting of quite light material and has tremendously increased the capacity of shape-cutting machines in addition to lowering the unit costs.

Cast iron may be cut by the usual hand blowpipe with a slightly different technique. The cut is not as precise as in steel, and the kerf is wider.

The high-alloy steels of the stainless variety are difficult and sometimes impossible to process by normal oxyacetylene cutting methods. High-chromium steel presents the greatest problem as it has a high affinity for oxygen at elevated temperatures and immediately forms highly refractory chromium oxide on the faces of the kerf. Heavy preheating and oversize nozzles can cut these steels with special manipulation. An improvement was made by hand-feeding an iron rod or wire into the reaction zone or by using a waster plate of ordinary steel on top of the stainless steel. Another method has been the actual melting away of stainless steel. This method is very slow, especially on large sections, and does not give a precise cut suitable for further fabrication. Recently these steels have been satisfactorily and economically cut by feeding certain powder materials, largely iron, into the oxygen stream.

Flame-Gouging — Flame-gouging is a process slightly different from conventional cutting in that a groove is cut instead of a cut completely through the metal. This depends on clever nozzle design and a relatively large jet of oxygen with proper controls and manipulations. This method is used for preparing plate edges for welding, for making grooves in steel plate, for removing temporary welds, and for preparing cracks in steel castings for later reclamation by welding.

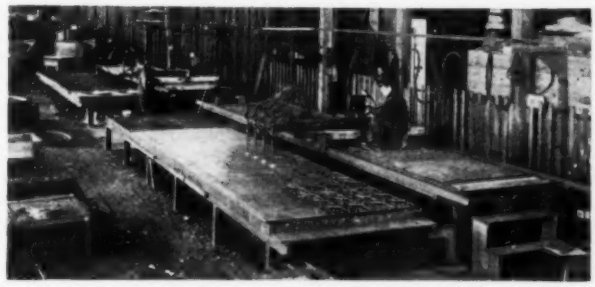


Fig. 12. Multiple blowpipe cutting

cut through steel plate, rivets or bolts cut, rivet heads removed. In fact, wherever iron and steel are used, the cutting process finds application.

This brief review is only a partial outline of the current application of oxyacetylene welding and cutting. Over the years, laboratory and field development have produced the apparatus and the techniques from relatively crude beginnings to the present widespread use where the process has permeated practically all industry, either before fabrication, demolition, or repair. At the same time, improved methods had to be developed to generate and distribute the gases in the quantities necessary for modern industry. But this is another story. Step by step, industry and laboratories have

Fig. 13. Stock cutting. Twelve identical parts are simultaneously shaped from ¼-in. material with a single blowpipe

Steel Conditioning — One of the most significant changes in modern steel-mill operations was brought about by oxyacetylene conditioning. This process, quite similar to gouging, removes surface defects in steel during its manufacture. It is variously known as deseaming, scarfing, or conditioning. Generally, however, the term "deseaming" (the removal of seams or cracks) is used when the operation is performed with a hand blowpipe. In mechanized steel conditioning, the entire surface of the billet, bloom, or slab, is removed by a conditioning machine set into the rolling mill line.

Conclusion

It will be seen that the uses of the cutting process are many and varied. Holes can be

Fig. 14. Flame-gouging grooves in steel plate

Fig. 15. Steel conditioning a steel slab

not only kept pace with the demand for the process but have developed new applications. Further observation of the increase in the use of acetylene and oxygen in welding and cutting leads to the very definite conclusion that the economy, mobility, and adaptability of the process will lead to more and more applications. In fact, during the past ten years the use of the process increased far more than in the previous thirty years, and it seems that if the philosophy of American production continues, the increase in the next ten years may exceed all previous records.

Nearly three fourths of all veterans receiving compensation benefits or retirement pay from Veterans Administration on October 1, 1949, served in World War II.

HANDY BOOKCASE OR UTILITY STAND

HAROLD O. AKESON
High School
East Orange, N. J.

There never seems to be enough shelf space around the house, especially in the smaller apartments and houses of the present day. A bookcase that would serve a dual purpose as another piece of furniture, namely, a bedside table or telephone stand, would appeal to a person because of its practicability. Such a project is described and illustrated in this article.

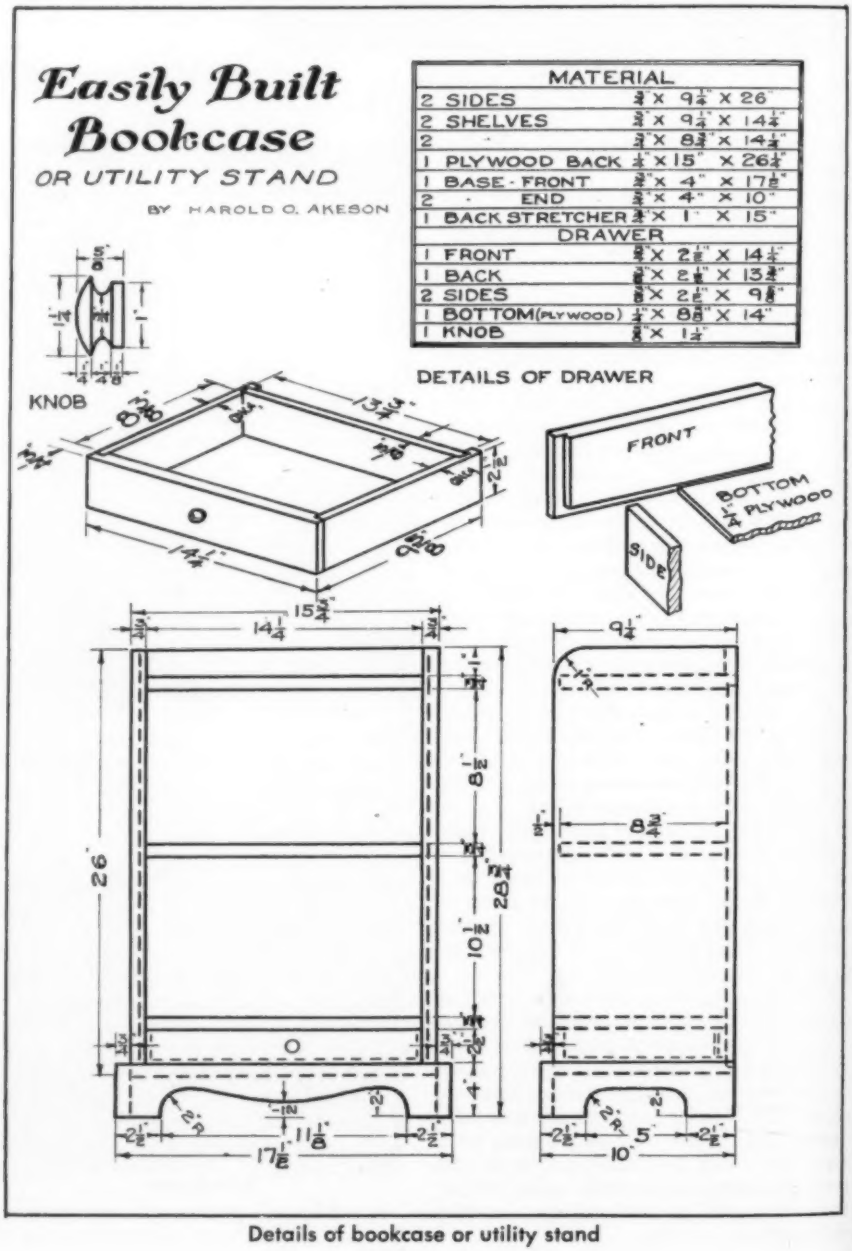
Material to make this piece of furniture should first be considered in the light of other furnishings and trends of the room in which it is to be used. The use of hard woods such as maple, oak, mahogany, and walnut would require a stain to match the other furniture. On the other hand, the taste may be along the lines of painted furniture. In such a case, it would involve the use of soft woods, or plywood, which are easier to work and cost less.

First, prepare the sidepieces. Next, cut out the rabbet for shelves, with the saw, and remove waste portions. If a machine saw is available this part of the work is simplified. A ¼-in. allowance is made along the inside back edges of the sides, to hold the plyboard. Next get the shelves ready. Sandpaper all parts. Assemble pieces and glue in place, using cabinet clamps for pressure. At this point, check for squareness and clean off any excess glue. While the glue is drying, the back could be made ready and sanded, as well as the three base pieces and the back strip on the top shelf. The front corners on the base should be mitered.

Upon removal of the clamps, after the glue has dried thoroughly, fit the plywood back into place. Do not be careless about this part even though it is on the back of the case. Fasten the back in place using ¾-in. brads or nails. Slant the nails slightly as they are driven into the sides and other supporting parts. Nails thus fastened into the wood hold better than those driven straight down.

The remaining part to make, is the drawer. Get the front, back, sides, and bottom pieces ready. When these are completed, as well as sanded, assemble them and fasten together with glue and brads. A knob may be purchased

Easily built bookcase or utility stand



Details of bookcase or utility stand

at a hardware store for a few cents. This should be fastened in the exact center of the drawer.

All nail holes should be filled and colored to match the finish. Finish for the bookcase is optional, depending on the wood selected and other furniture with which it is to be placed. Be sure to sandpaper, with very fine sandpaper, after each application of finish has dried.

SEVEN STEPS IN MOTION PICTURE PRESENTATION

VINCENT WILLIAMS
Student, University of California
Santa Barbara College
Santa Barbara, Calif.

I. Before considering the use of motion pictures in the shop class, the instructor should:
a) Become familiar with the various kinds of educational films.
b) Have access to and know the best film catalogs pertaining to his field.
c) Be able to use to the best advantage the teaching guides which usually accompany educational films.
d) Have had experience in the operation of film projectors available for use in his shop class.
e) Have a file system which includes the listing of shop educational films that he has personally viewed, as well as a synopsis and evaluation of each.

II. The instructor should not decide upon the showing of a motion picture unless one of the following situations is expressed or anticipated:
a) Certain necessary details of a demonstration would not lend themselves to comprehension or emphasis if performed by the instructor.
b) A motion picture would provide the best medium through which the class might view the involved manipulative processes, each in its own industrial setting.
c) The class would obtain a broader and more accurate view of the informational aspects of the processes involved, if a motion picture were used.
d) The use of a motion picture would not only break the monotony of the class routine, but would serve, at the time, the instructor's purpose better than any other means of presentation.

III. Having decided upon the showing of a motion picture, the instructor should select the film with the following questions in mind:
a) Can it be correlated with the type of work being done in the shop?
b) Does it approach the comprehension level of the students?
c) Does it contain extraneous matter such as excessive commercial advertisements and the like?
d) Does it stress unnecessary or trivial details?
e) Is the presented subject matter technically correct?
f) Do the manipulative steps follow one another in logical sequence?
g) Are important details emphasized and later summarized?
h) Is the film presented in an interesting and attention-getting manner?
i) How much time does the film consume?
j) Does the film contain values that can be perceived by the students?
k) Is the film accessible to the extent that it can be presented at a desirable time?
l) What expenses are involved in the showing of the film?
m) Does the film possess pupil-motivating qualities?
n) Is the film of good quality from a photographic point of view?

IV. After having selected the motion picture, the instructor should not only thoroughly apprise himself of its contents, but should prepare the class for its presentation. This can be accomplished by the following:
a) Reading assignments
b) Class discussions
c) Talks by the instructor or visiting industrial craftsmen
d) Field trips
e) Quizzes
f) Shop projects
g) Exhibits or other visual aids
h) Demonstrations

V. Before the class convenes, the instructor should have everything in readiness, as follows:
a) Set up equipment.
b) Have film in projector and ready to go.
c) Have projector focused.
d) Be prepared to preface film showing with brief, pertinent information.
e) Insure that all blinds can be drawn.
f) Make certain that proper ventilation is provided.
g) Check all doors for easy exit in the event of fire.

VI. While showing the film, the instructor should:
a) Have at hand all film reels that are to be shown.
b) Watch students, if possible, for signs of disinterest or interest, restlessness or misunderstanding.

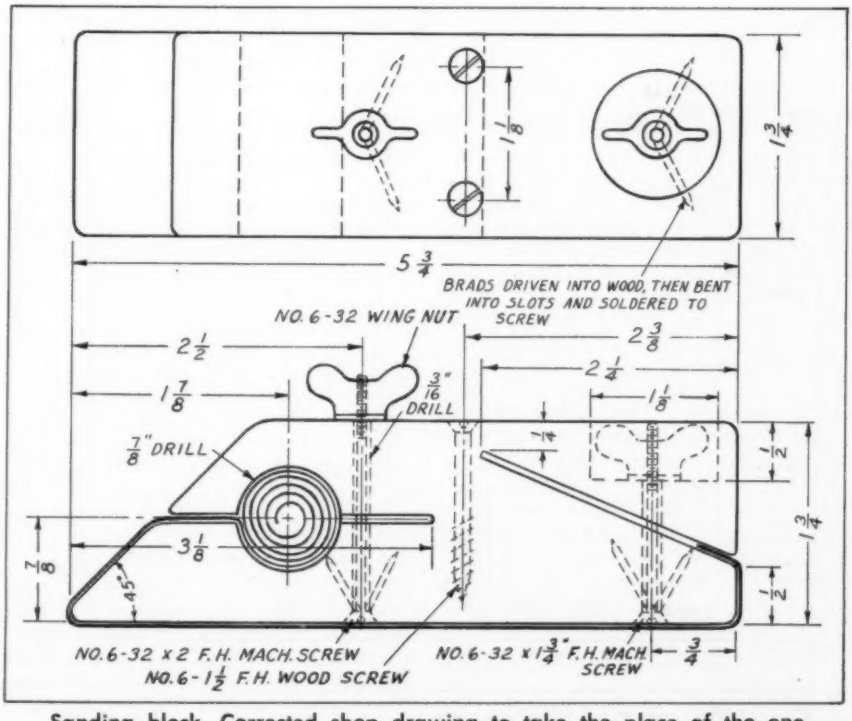
VII. The firm presentation should be followed up by:
a) Discussions
b) Quizzes
c) Re-showings for emphasis or clarification
d) Applications of the processes shown in the film.

TWO FLY-TYING VISES

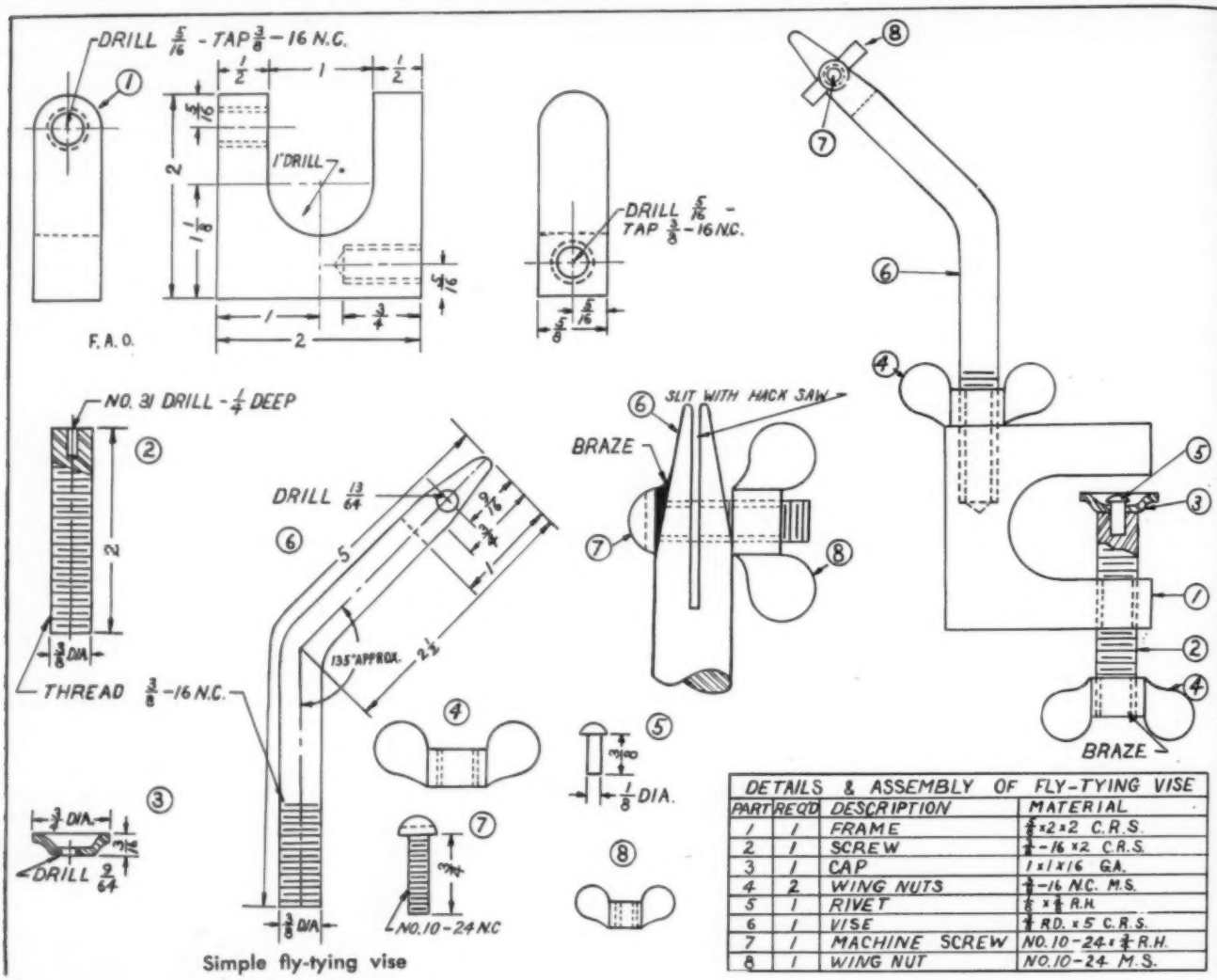
CHARLES M. REID
Fernie, B. C., Canada

The two fly-tying vises, described here, are used in Grades 9 and 10.

For the collet type vise, which is used for Grade 10, we cast the clamp frame and hand wheel in aluminum using regular molding sand and wood patterns. For the Grade 9 vise, the clamp frame is made of 5/8 by 2-in. cold rolled steel. For a left-handed boy, the wing nut which tightens

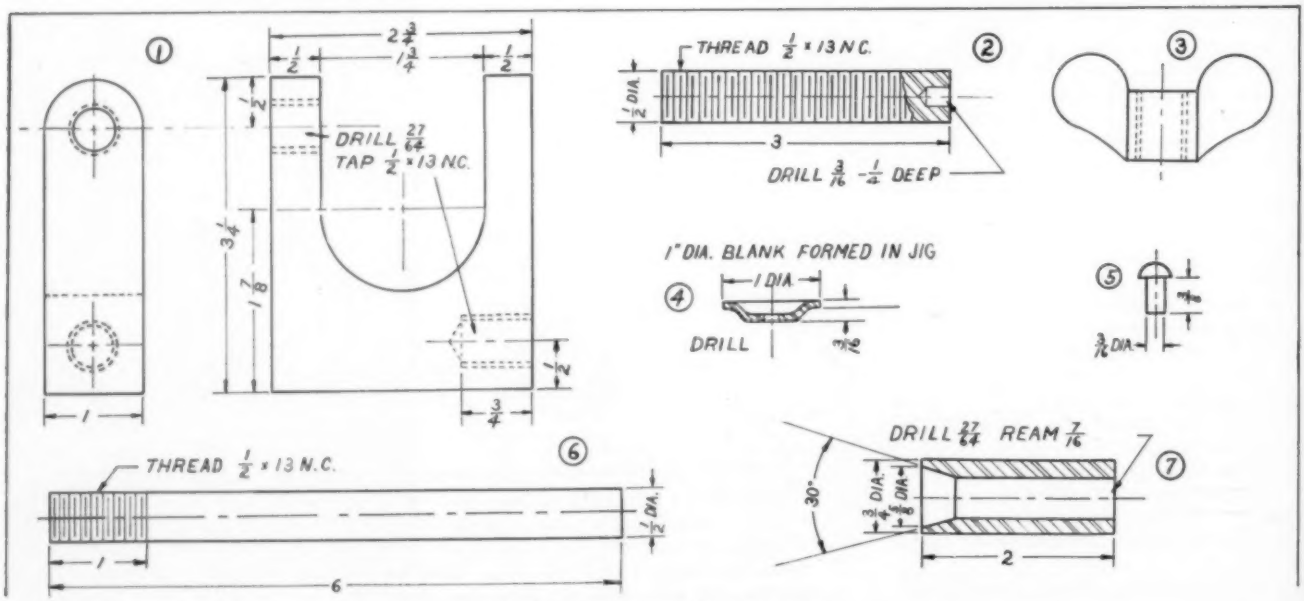


Sanding block. Corrected shop drawing to take the place of the one shown for the sanding block on page 381 in the November, 1949, issue of this magazine

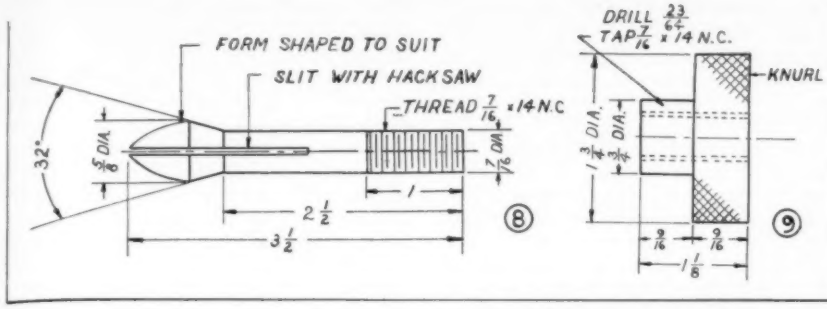


DETAILS & ASSEMBLY OF FLY-TYING VISE			
PART	REQ'D.	DESCRIPTION	MATERIAL
1	1	FRAME	1/4 x 2 x 2 C.R.S.
2	1	SCREW	3/8 - 16 x 2 C.R.S.
3	1	CAP	1 x 1 x 16 GA.
4	2	WING NUTS	3/8 - 16 N.C. M.S.
5	1	RIVET	1/8 x 1/4 R.H.
6	1	VISE	1/4 RD. x 5 C.R.S.
7	1	MACHINE SCREW	NO. 10-24 x 3/4 R.H.
8	1	WING NUT	NO. 10-24 M.S.

Simple fly-tying vise

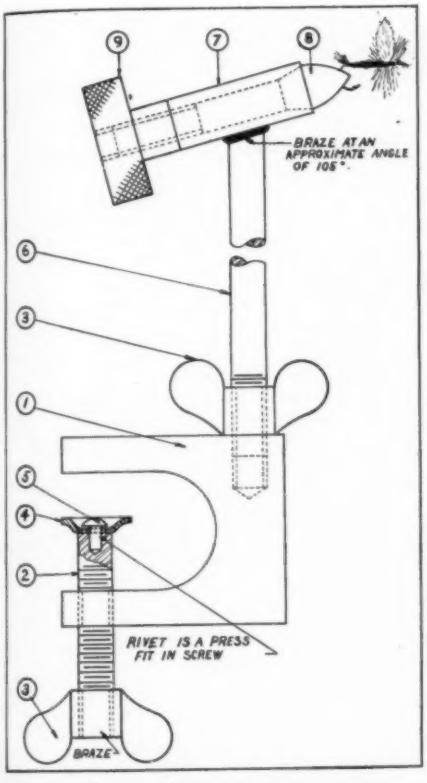


Details of collet-type fly-tying vise



FLY-TYING VISE			
PART	REQD	DESCRIPTION	MATERIAL
1	1	CLAMP	CAST AL.
2	1	CLAMP SCREW	1/2 RD. x 3 C.R.S.
3	2	WING NUT	1/2 x 13 N.C. M.S.
4	1	CAP	16G x 1/4 B.I.
5	1	RIVET	3/16 RD. x 3/8 R.H.B.I.
6	1	STEM	1/2 RD. x 6 C.R.S.
7	1	COLLET SLEEVE	3/4 RD. x 2 C.R.S.
8	1	COLLET	3/4 RD. x 3 1/2 C.R.S.
9	1	WHEEL	CAST AL.

Collet-type fly-tying vise



Assembly of collet-type fly-tying vise

the vise tip should be reversed as it will interfere with the looping of the thread when tying flies.

Both of these projects are very popular because most lads are budding Isaac Waltons.

GENERAL SAFETY PRECAUTIONS FOR ALL SHOPS

LOUIS BAROCCI

High School

Cudahy, Wis.

The following precautions are those of general safety which students in any shop must observe.

1. Machines must not be operated in the absence of the instructor. Permit no student to operate dangerous machinery until he has received permission from the instructor each and every time he wishes to use the machinery. This teaches the student that supervision is a required part of the shopwork.

2. Design safety tests for each piece of dangerous machinery, and require that a student perform a satisfactory test before he is permitted to use the equipment. This does not render the student immune to accidents, but it will contribute considerably toward the elimination of casualties.

3. Never tolerate "horseplay" in the shop; strict disciplinary measures will eliminate inattention to work.

4. Never hurry students when they are operating dangerous machinery.

5. Post feed and speed charts for machines, and require each student to use only the feed and speed required for the work at hand.

6. Keep floors clean and dry at all times, and free from any objects which might cause someone to trip and fall.

7. Discard obsolete equipment which cannot be brought up to existing safety standards.

8. Maintain good housekeeping. Have a place for everything, and keep everything in its place.

9. When repairing machinery, always break the circuit at the starting switch and lock it in the open circuit position.

10. Always stop machinery before oiling it.

11. Never permit anyone to stand in line with a revolving tool or flywheel.

12. Permit no conversation between a machine operator and another student.

13. Discard all unsafe ladders, or make repairs to render them safe.

14. Do not permit oil on the floors.

15. Keep hand edge tools sharp. A dull tool requires so much more uncontrolled force that it causes accidents.

16. Always wear goggles whenever flying chips, injurious light rays, or molten metal may endanger the eyes.

"(a) *Fogging Goggles:* Glass lenses, whether in goggles or ordinary spectacles, will fog under certain conditions of temperature and humidity.

"This is annoying, but may be prevented, very largely at least. Never discard protective goggles merely because fog or other moisture or dirt gathers on them. Take proper measures to keep the lenses clear.

"To prevent fogging, wipe the lenses clean and dry with a clean cloth, then apply a soapy film to both sides of the glass and wipe off the excess, leaving a very thin coating through which you can see. Glycerine pencils are made especially for this purpose, but almost any good grade of soap may be used. The film will last quite a while but the process should be repeated as often as fogging makes it necessary.

"Each time you use the goggles, cleanse the lenses carefully. Perspiration often causes fogging. A sweat band worn on the forehead just above the goggles should help prevent this. The band may be made of several folds of cheese cloth about one and one-half inches wide, or of gauze of similar width. Fasten it in place with an elastic band. Remember to keep your goggles as free as possible from dirt and fogging."[1]

17. Use tools with care. Never point them at anyone or leave them lying around unattended.

18. Stack supplies and materials carefully.

19. Hand tools or materials to a fellow student; never throw them.

20. When the instructor must be out of the shop, he should turn off the power.

21. Whenever students note that a machine is out of order, they should notify the instructor.

22. Wear only close-fitting clothes which cannot be caught in the moving parts of a machine. Remove ties, and keep hair back.

23. Use a switch lever or a belt pole to shift a belt.

24. Use files only when they are equipped with handles. Insist on only safety handles for all files and rasps.

25. Do not use machines tor trivial operations. Use hand tools.

26. Inspect all lumber for loose knots, nails, splits, or other hazards before machining it.

27. Know that rings on your fingers are safety hazards.

28. Feed stock only as fast as a machine will take it with ease. Never force the stock.

29. Floor lines designate the operator's area. All other students must stay outside of these safety lines.

30. No student, except in an emergency, shall start or stop a machine for another student.

31. Allow no condition to exist which will divert the attention of a machine operator.

[1]Safety Instruction Cards are obtainable from the National Safety Council, Chicago, Ill.

32. Do not carry sharp or pointed tools in pockets.

33. Keep both hands behind the cutting edge of any tool.

34. Never permit lumber with nails protruding to lie around the shop or storeroom. Pull the nails out.

35. Post the fundamental rules for clean, safe, finishing practice, in the finishing room.

36. Do not wash hands or face with turpentine to remove paint. Some people are allergic to turpentine.

37. Be a good housekeeper. Keep tools and materials in their proper places.

38. Do not carry articles in the mouth. Walking around with a pencil, pen, scratch awl, paint brush or similar small instruments in one's mouth is extremely dangerous. There are instances on record of a person's having been killed because he had a pencil in his mouth. A slip which caused him to fall forward drove the pencil point through the roof of his mouth. Other accidents of this nature, though not so serious, have come from colliding with another person or with a solid object. Similar accidents have resulted from carrying edged tools about in the hand instead of in a tool box. Since good edged tools for shopwork should be very sharp for the best work, it is easy to see how a person carrying such tools with him may accidentally cut himself or someone else who is passing by.

Although the general safety rules just listed probably do not cover all possible dangers in all the school shops, the most significant and important general rules have been given. The proper enforcement of these rules is just as vital a part of safety as is the enforcement of safety rules governing the operation of a particular machine. The proper enforcement of these rules, plus the constant alertness of operators and workers, is essential if one wants to run a shop with a low accident rate.

Mississippi Valley Industrial A[illegible]erence, [illegible]

First row, left to right: L. T. Smith, Bowling Green, Ky., John J. Metz, Industrial Arts and Vocational Education Magazine, Milwaukee, Wis., William T. Bawden, State Teachers College, Pittsburg, Kans., Arthur B. Mays, University of Illinois, Urbana, Ill., Clyde A. Bowman, The Stout Institute, Menomonie, Wis., D. J. Crowley, State University, Bowling Green, Ohio, Verne C. Fryklund, The Stout Institute, Menomonie, Wis., Victor Randel, Sam Houston College, Huntsville, Tex., John F. Friese, State College, Pa., Homer J. Smith, University of Minnesota, Minneapolis, Minn., James McKinney, American School, Chicago, Ill., Milo T. Oakland, Teachers College, DeKalb, Ill., L. Lowton Gore, Peabody College, Nashville, Tenn.

Second row, left to right: DeWitt Hunt, Oklahoma, A & M. College, Stillwater, Okla., Charles R. Kinison, Ohio University, Athens, Ohio, William D. Stoner, Miami University, Oxford, Ohio, S. M. Dell, McPherson College, McPherson, Kans., C. Kenneth Beach, Cornell University, Ithaca, N. Y., Chris H. Groneman, Texas A. & M. College, College Station, Tex., John Feirer, Western Michigan College, Kalamazoo, Mich., John A. Fuzak, Michigan State College, Lansing, Mich., H. London, University of Missouri, Columbia, Mo., Donald F. Hackett, Georgia Teach College, Collegeboro, Ga., H. L. Oakley, Murray State College, Murray, Wayne Wetzel, Western Illinois State College, Macomb, Ill., R. M. Torgers Bowling Green State University, Bowling Green, Ohio, Walter A. Klehm, East State College, Charleston, Ill., Fred Strickler, Bradley University, Peoria, Ill., P. Waldeck, State Department of Education, Columbus, Ohio, Frank Roy Key Detroit, Mich., William T. Sargent, Northern Michigan College, Marquette, Mi Amos G. Williams, State College, Cape Girardeau, Mo., Kenneth L. Bing, St Teachers College, Greenville, N. Car.

Third row, left to right: M. K. Humble, University of Illinois, Urbana, Ill., Ha A. Pederson, Platteville Teachers College, Platteville, Wis., Howard F. Nels University of Minnesota, Minneapolis, Minn., Thomas R. Gaines, Central Miss

Association News

INDUSTRIAL ARTS CONFERENCE OF THE MISSISSIPPI VALLEY

This year's annual meeting of this organization, held November 10, 11, and 12, 1949, at Hotel LaSalle, Chicago, Ill., marked the fortieth year of the existence of this group of educators whose influence has done much to make industrial arts and vocational education what it is today.

The membership is made up of heads of departments responsible for the training of teachers and supervisors of industrial arts and vocational education.

The territory covered by this organization comprises the states of Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, Texas, and Wisconsin.

At the meeting each year there are five presentation and discussion periods, extending from Friday morning to Saturday at noon. At the business meeting on Saturday morning new candidates are voted on for membership, and the meeting time and place is decided on for the next year.

The subject for discussion on Thursday, November 10, at 9:30 a.m., was "Student Teaching in Industrial Arts." DeWitt Hunt, Harry A. Pederson, and Nelson A. Hauer were the speakers. The usual thoughtful discussion followed the presentation.

ial Conference, November 10 to 12, 1949

State College, Warrensburg, Mo., Wayne P. Hughes, National Safety Council, Chicago, Ill., Lawrence W. Prakken, School Shop, Ann Arbor, Mich., Ralph Wenrich, State Board of Vocational Education, Lansing, Mich., N. A. Hauer, Louisiana State University, Baton Rouge, La., Raymond H. Larson, State Teachers College, St. Cloud, Minn., Robert A. Hardin, University of Oklahoma, Norman, Okla., Asbury Smith, Central State College, Edmond, Okla., Charles A. Elliott, Eastern Illinois State College, Charleston, Ill., Dewey F. Barich, Kent State University, Kent, Ohio, Deyo B. Fox, Western Michigan College, Kalamazoo, Mich., John F. Plummer, Jr., Southern Illinois University, Carbondale, Ill., W. C. Bicknell, Southern Illinois University, Carbondale, Ill., Fred J. Schmidt, Jr., Ball State Teachers College, Muncie, Ind., Oliver C. Bumb, Ball State Teachers College, Muncie, Ind., Emerson W. Manzer, Platteville Teachers College, Platteville, Wis., Sylvan A. Yager, State Teachers College, Terre Haute, Ind., Ray Stombaugh, State Normal University, Normal Ill., and Alan R. Pawelek, Ball State Teachers College, Muncie, Ind.

At the 9 o'clock session on Friday morning, Victor Randel, Charles R. Kinison, and J. A. Fuzak presented "The Graduate Program on the Master's Level" for the deliberation of the conference.

At 2:00 p.m., on Friday, Chris Groneman, Wayne Wetzel, John Feirer, and Allen Pawelek led the discussion on the subject of "Air Age Education and Industrial Arts."

At the 8:30 a.m. session on Saturday, W. C. Bicknell, W. T. Stoner, and H. L. Oakley presented the subject of "The Problem Solving Method in Industrial Arts Teaching" for the discussion of the membership.

Dr. Wm. T. Bawden gave a general résumé of this year's program and called attention to the large attendance at this year's meetings. He also called attention to the fact that the conference was started 40 years ago this year at Bradley Institute, Peoria, Ill.

At the business meeting it was decided that the 1950 meeting would again be held at the LaSalle Hotel, Chicago, Ill., on Thursday, Friday, and Saturday, of the first week in November.

Dr. Verne C. Fryklund is the chairman of the Industrial Arts Conference of the Mississippi Valley upon whom devolves the main work of making the program and conducting the business of the conference.

♦ The Four-State Regional Conference on Industrial Education at Pittsburg, Kans., held on October 21 and 22, 1949, was attended by approximately 500 industrial and vocational educators.

The theme of this year's conference was "Industrial and Distributive Education to Meet Life's Demands."

Dr. William T. Bawden, director of publications, Pittsburg, presided at the first general meeting.

Prof. Arthur B. Mays, department of industrial education, University of Illinois, was the principal speaker. His subject was "The Role of the Public Schools in Industrial Education."

At the general dinner meeting Dr. Roy W. Roberts, head of the department of vocational teacher education, University of Arkansas, presided, and Dr. Fred W. Hosler, superintendent of public schools, Oklahoma City, Okla., addressed the group on "Educational Challenges for the Forgotten Student."

Saturday, Merton Wheeler, supervisor of industrial education, Jefferson City, Mo.; H. A. Allender, Tulsa; Wilfred Byram, Joplin; L. B. Carlyon, Pittsburg; Armin F. Gimbel, Springfield; E. R. Glazener, Arkansas A. & M.; W. A. Hankammer, Pittsburg; E. W. Jones, Pittsburg; Bill Kelso, Fort Smith, Ark.; and Harvey R. Parks presented methods and techniques that contribute to an enriched program of industrial education.

Emil H. Rohlfs, co-ordinator, Russellville public schools, Russellville, Ark., spoke at a general session on "General Related Study Materials for Diversified Occupations," and M. J. DeBenning of Oklahoma A. & M., spoke on "Contributions Distributive Education Can Make to the Education of the 60 Per Cent."

On Saturday's program R. W. Baker, Joplin; W. A. Clark, Little Rock; L. E. Falgren, Kansas City; C. E. Paul, Muskogee, Okla.; and V. H. Stroud of Hutchinson, and J. E. Moore, VA Regional Office, Wichita, conducted a session on "Rehabilitation of Disabled Veterans."

Prof. Arthur B. Mays addressed the group at the general luncheon meeting and spoke on "The Meaning and Place of Industrial Arts in Secondary Education." The program adjourned following the Ship's Program which was under the direction of Forest Penny of Pittsburg.

On October 22, Leland D. Boone, Ray A. Boyer, Henry Wichers, Lewis D. Baker, Chester A. Grimm, Samuel Jones, Carl D. Knepper, Kenneth G. McKeever, George Miller, and Elbert H. Winesburg, were initiated into the Epsilon Pi Tau fraternity.

Glenn F. Best of Norfolk, Va., receives the E.P.T. laureate citation award at the annual banquet of the Upsilon Chapter of Epsilon Pi Tau fraternity at the West Virginia Institute of Technology, Montgomery, W. Va.

Reading from left to right: Robert Phipps, student and president of the Upsilon Chapter of Epsilon Pi Tau; Dr. Edward S. Maclin, director of the evening program at Marshall College; Glenn F. Best (receiving citation), Norfolk City Schools; Dr. John R. Ludington, industrial-arts specialist from the U. S. Office of Education; Prof. Kenneth L. McFarland, (presenting the award), trustee of Epsilon Pi Tau; and Prof. J. Frank Garber, industrial-arts department at West Virginia Tech.

♦ The annual banquet of the Upsilon Chapter of Epsilon Pi Tau was held at the West Virginia Institute of Technology, Montgomery, W. Va., at 6:30 p.m., on November 12, 1949.

Dr. John R. Ludington, Industrial-arts specialist from the U. S. Office of Education, was the main speaker at this meeting. He chose "Industrial Arts — Its Place in Modern Education," as his subject.

Before the banquet the following were initiated into the Epsilon Pi Tau fraternity: William A. Williams, state director of trades and industries; Theodore Chambers, industrial arts instructor at Harper, W. Va.; Emmette W. Lilly, industrial arts instructor at Salem, Va.; and the following Tech students: Ralph Basilio, John Robinson, Jimmie Pennington, and Elmer James.

Lilly and Chambers are Tech graduates.

Off campus guest for the evening was H. K. Baer, secretary, state board of education; Dr. Edward S. Maclin, director of the evening program at Marshall College; Dr. William E. Warner; and Dr. Robert E. Smith of Ohio State University.

♦ The Wisconsin Industrial Arts Association held its annual meeting at Milwaukee, Wis., on Thursday, November 3, 1949, at 2:00 p.m.

The subject, "How Can State Supervision Promote and Improve Industrial Arts in Wisconsin," was presented by a panel consisting of: Hans W. Schmidt, moderator, Wisconsin State Department, Madison; Clyde Bowman, Stout Institute; T. E. Beach, Racine; Leo R. Ebben, Kohler; and E. W. Manzer, Platteville.

Reuben A. Charette, Milwaukee, was the chairman of the meeting.

The newly elected officers are: Arthur A. Flanagan, Berlin, president; Bernhard Hagan, Manitowoc, vice-president; Harland J. Shufelt, Racine, secretary-treasurer.

Industrial-arts group meetings for general metal, machine shop, mechanical drawing, printing, and woodworking were held on Friday afternoon.

♦ The New England Industrial Arts Teachers Association held its 12th annual convention on November 4 and 5, 1949, at Providence, R. I. Over 200 members, representing the six New England states, were in attendance.

At the luncheon on Friday, Dr. Michael F. Walsh, state director of education, was the main speaker.

A symposium on "Industrial Arts in the Life Adjustment Program" was then presented, after which round-table discussions were held on general drawing, general woodworking, general metals, graphic arts, general shop, administration, supervision, and teacher education.

The guest speaker at the banquet Friday evening was Emanuel E. Ericson, professor of industrial arts, Santa Barbara College, University of California. His topic was "Industrial Arts as Life Adjustment Education."

The business meeting was held on Saturday morning, after which the luncheon was held. Emanuel E. Ericson, the main speaker, spoke on "Making an Industrial Arts Teacher."

♦ At the meeting of the Alpha Alpha chapter of Epsilon Pi Tau, at Kansas State Teachers College, Pittsburg, Kans., on November 9, Russell Hall, chairman of the Pittsburg, Kans., Chamber of Commerce Industrial Committee, discussed the industrial activities in Pittsburgh. In his address he presented the history of industry of Pittsburg and the surrounding territory and its present-day activity.

Alpha Alpha chapter, and the Industrial Education Club held a joint Christmas party on December 2. The Industrial Education Club is the largest single departmental club on the campus with over 150 members.

The chapter also will hold a steak dinner for its graduating members, January 9, 1950.

♦ Pi Lambda Theta announces two awards of $400 each, to be granted on or before August 15, 1950, for significant research studies in education.

An unpublished study may be submitted on any aspect of the professional problems and contributions of women, either in education or in some other field. Among others, studies of women's status, professional training, responsibilities, and contributions to education and to society, both in this country and abroad, will be acceptable.

A study may be submitted by any individual, whether or not engaged at present in educational work, or by any chapter or group of members of Pi Lambda Theta.

Three copies of the final report of the completed research study shall be submitted to the Committee on Studies and Awards by June 1, 1950. Information concerning the awards and the form in which the final report shall be prepared will be furnished upon request. For further information address Alice H. Hayden, University of Washington, Seattle 5, Wash., chairman.

♦ The officers of the Kansas Vocational Association for 1949–50 are: president — Howard Bradley, vocational agriculture instructor, Beloit; vice-president representing: *homemaking* — Miss Hope Watts, chairman, Vocational Homemaking Teachers, Silver Lake; *business education* — Mrs. Eula S. Walker, president, Co-ordinator-Instructors Association, Salina; *trade and industry* — Ralph O. Johnston, president, Kansas Industrial Education Association, Anthony; *agriculture* — Howard Bradley; secretary-treasurer — F. E. Carpenter, vocational agriculture instructor, Highland Park High School, Topeka, Kans.

♦ The officers of the Kansas Industrial Education Association for 1949–50, are: president — Ralph O. Johnston, industrial arts instructor, High School, Anthony; vice-president — Algot E. Anderson, industrial arts instructor, East Topeka Junior High School, Topeka; secretary-treasurer — Kenneth R. Powers, instructor of auto mechanics and machine shop, Topeka High School, Topeka.

Personal News

♦ HOWARD B. GUNDERSEN, since 1937 state director of trade and industrial education for Utah, and recent president of the Salt Lake Area Vocational School, resigned his position in the Vocational School to accept an appointment on October 15, 1949, as supervisor of training in the Utah Copper Division of the Kennecott Copper Company. Mr. Gundersen had returned October 2 from a three-month assignment in Germany with the military government of that country to study and advise on apprentice training in the occupied area.

Mr. Gundersen has long been recognized for his leadership in vocational education. A graduate of the Utah State Agricultural College, Logan, Utah, he took his master's degree in industrial education in the University of Wisconsin. For four years, he was engaged in co-ordination and apprentice training in trade and industrial education in Wisconsin and Pennsylvania. He is a former teacher of industrial arts in the Utah public schools and an instructor at the Branch Agricultural College, Cedar City, Utah. He succeeded Dr. Irvin S. Noall as state director of trade and industrial education and was chiefly instrumental in developing and administering the tremendous war production training program in Utah which served the air corps and the supply services. Mr. Gundersen has had a number of special assignments in the vocational education field, among which are survey and advisory responsibilities with the Inter-American Education Commission, program development appointments with the army air corps, and appointments on numerous committees for the promotion of trade and industrial education and industrial teacher training. His leadership in industrial arts has been widely recognized through development under his direction of the two volumes of industrial arts in Utah, Administrator's Handbook, and Course of Study, which have received wide acceptance in teacher training institutions and state and city departments of education.

In his new appointment, Mr. Gunderson will develop supervisory, apprentice and personnel training programs at the Utah Copper Company mines in Bingham Canyon, Utah.

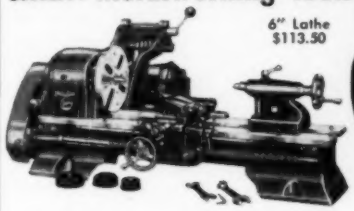
♦ GOVERNOR LANGLIE, Olympia, Wash., was presented a handsome bronze plaque — the Meritorious Award of the Association of Casualty and Surety Companies, 60 John St., New York City, N. Y. — for maintaining high standards in driver instruction in more than 25 per cent of the high schools of the state and enrolling more than 25 per cent of its eligible students in such courses. Approximately 40 per cent of Washington schools conducted courses in 1948–49, with almost one third of all eligible students enrolled.

(Continued on page 12A)

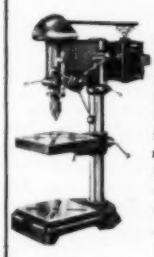
Atlas gives you the greatest values in bench-size PRECISION LATHES

"QUICK-CHANGE" 10" LATHE

Atlas Metalworking Tools



6" Lathe $113.50



The Atlas 6" is the lowest-priced precision metalworking lathe made. Write for literature on any of the Atlas tools illustrated.

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Drill Press

Miller—$305.00

Atlas lathes have construction and performance features found in no other lathes of comparable size and price. Timken tapered roller bearings in the headstock, precision-ground bed, power cross and longitudinal feeds . . . only Atlas has all these and other design and construction advantages at low cost.

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Belt and Disc Sander

10" Floor Saw

6" Jointer

Wood Shaper

24" Jig Saw

12" Wood Lathe

PERSONAL NEWS

(Continued from page 40)

♦ WALLACE D. JOHNSON has been made president of the Yates-American Machine Co., Beloit, Wis.

He succeeds E. J. Dalton, who formerly held this position jointly with that of chairman of the board. Mr. Dalton will continue to serve as chairman of the board.

Mr. Johnson began his association with the company 37 years ago and has successively held the positions of chief engineer, works manager, and vice-president.

♦ CHARLES V. YOUMANS has been appointed to the teacher-training staff in industrial education at the University of Kentucky to replace Thomas L. Hankins, who has been named director of the extension branch of the university.

♦ O. H. DAY, former director of vocational education, Kansas City, Mo., is now product engineer of the Butler Mfg. Co., in Kansas City.

♦ A. H. HOLLENBERG, specialist in farm mechanics education, U. S. Office of Education, conducted a two weeks' workshop in agricultural science at Oregon State College last summer

♦ W. W. PENNELL, who has conducted the pattern shop of the Vocational School at St. Paul, Minn., since 1920, was feted at a banquet arranged for him by graduates from his shop.

Selmer H. Berg, superintendent of the St. Paul schools gave Mr. Pennell an excellent tribute at the banquet.

Mr. Pennell will retire at the end of the school year, 1948–49.

♦ FRANCIS BERGUP, who formerly taught at the Washington High School, St. Paul, Minn., teaches patternmaking at the Vocational School, St. Paul, Minn., filling the place vacated by the retirement of W. W. Pennell.

♦ DR. GORDON O. WILBER, director of vocational education, Oswego State Teachers College, Oswego, N. Y., was a guest speaker at Wayne University on October 4 and 5.

♦ W. E. LOWRY, executive director of the State Board for Vocational Education, Austin, Tex., has been appointed as a member of the Committee on the U. S. Armed Forces Institute. His term runs from July 1, 1949, to June 30, 1952.

♦ DR. H. ROBERT KINKER has been appointed associate professor of education at the Indiana University.

He received his B.S. degree in vocational education from the University of Toledo in 1938, the M.A. degree from New York University in 1942, and the Ed.D. degree from New York University in 1949.

♦ OLEN D. DAVIS has been appointed consultant in industrial arts education of the state of California.

♦ DR. WILLIAM S. TAYLOR, dean of the College of Education, University of Kentucky, died at Lexington recently. He worked as a leader in Texas, Pennsylvania, and on the Federal Board for Vocational Education.

The board of trustees of the University of Kentucky unanimously voted to rename the College of Education building the "William S. Taylor Education Building" in tribute to the deceased.

♦ HAROLD L. MINKLER has been named to succeed John J. Schommer as director of placement at Illinois Institute of Technology.

The appointment becomes effective September 1 with the retirement of Mr. Schommer, who has been director of placement since 1938, and athletic director at Illinois Tech since 1913.

At present Mr. Minkler is assistant director of placement, co-ordinator of the Illinois Tech cooperative programs, and associate professor of technical drawing.

♦ DR. KARL T. COMPTON has been elected a director of the McGraw-Hill Publishing Company.

Dr. Compton is chairman of the research and development board of the National Military Establishment and chairman of the Corporation of the Massachusetts Institute of Technology. Until recently he was president of M.I.T., and during his career, has held many important public and private research and administrative positions.

♦ EDWARD J. QUEEN, instructor of aircraft mechanics at the Phelps Vocational School in Washington, D. C., has been named assistant principal at the Randall Junior High School, Washington, D. C.

Mr. Queen is a graduate of Hampton Institute and received his M.A. degree from Teachers College, Columbia University. He is currently studying at New York University for his doctor's degree.

♦ Harry Schmidt, Minnesota state director of vocational education, is in Germany on a tour of duty for the U. S. Office of Military Government for Germany.

♦ WALTER C. BROWN, state supervisor of industrial education, Missouri State Department of Education, who was a visiting instructor at the University of Missouri during the 1949 summer session, has joined the staff of the department of industrial education as an assistant professor.

♦ LAWRENCE M. FREDERICK of Butler, Pa., formerly research assistant in the University of Missouri, has accepted a position in the New Mexico State Teachers College at Silver City.

♦ J. E. WHITE, 1802–08 South Seventh St., St. Louis, Mo., has been appointed distributor for Hobart Brothers and will operate under the name of Hobart Welder Sales & Service.

♦ JOHN KYLE is teaching industrial arts at Clinton, Ind. He has taken over the work formerly taught by Cecil McWethey, who has entered Indiana State College to complete his bachelor's degree.

♦ GEORGE KNEZEVICH is teaching industrial arts in the Franklin School in Gary, Ind.

♦ FRANK DEBRUCKER is teaching industrial arts and coaching in the Jackson Township High School near Valparaiso, Ind. Mr. DeBrucker was graduated from Indiana State College in 1948.

♦ ROBERT L. KESTER, who was graduated from Indiana State College in 1948, is teaching industrial arts and physical education at Plymouth, Ind.

♦ FRANCIS E. JONES is the new teacher of industrial arts at Sweetser, Ind. He is a graduate of Indiana State College.

♦ LESTER PAGE is teaching industrial arts and coaching at Wheatland, Ind. He was graduated from Indiana State College in 1948.

♦ JOHN PORTER is teaching industrial arts in the Warren Central High School, Indianapolis, Ind. He was graduated from Indiana State College last June.

♦ Victor J. Wentzel, formerly instructor of industrial arts at the High School, Ottawa, Kans., has been appointed state supervisor of homebound projects of the vocational rehabilitation department.

♦ WILLIAM GEORGE is teaching industrial arts in the Parma High School, Parma, Miss.

♦ JAMES SANCHEZ is teaching industrial arts and physical education in the Risco High School, Risco, Miss.

♦ DAVID DAILY is teaching the general shop at Van Dyke, Mich.

♦ WILLIAM H. ROE has been appointed vocational education research specialist in the office of the Michigan State Board of Control for Vocational Education.

♦ RICHARD W. HOWES has been made assistant director of the Bureau of Vocational Education, State Department of Education for Connecticut.

♦ DR. EDWARD C. CREUTZ has been appointed head of the Department of Physics, Carnegie Institute of Technology, effective July 1, 1949.

♦ DR. A. M. FIELD, who recently retired as head of the Department of Agricultural Education at the University of Minnesota, has accepted a position with the Minnesota State Department of Education as assistant state supervisor for agricultural education.

♦ JOHN O. PREDALE of Newark, N. J., has been named assistant professor of mechanical engineering at Illinois Institute of Technology. The appointment was effective September 1.

♦ HARVEY SCOTT, vocational department head at Western High School, Detroit, Mich., died of a heart ailment, on Thursday, April 21, 1949.

News Notes

♦ The 22nd Annual Printing Education Week, sponsored by the National Graphic Arts Education Association, with the co-operation of The Franklin Institute and the International Benjamin Franklin Society, Inc., is scheduled for January 15–21, 1950.

It is being widely observed in educational institutions throughout the country.

Its objectives are: (1) to commemorate Benjamin Franklin's 244th birthday anniversary, January 17, 1950. (2) To bring more forcibly to the youth of America in the nation's schools the democratic principles and wisdom of Benjamin Franklin. (3) To call attention to the importance of printing — "as to what printing *is*, how it works, what sort of a career it offers, and why it has a social value above almost any other industry."

♦ The School Board of Reading, Pa., has issued a 24-page, 8¼ by 11½-in. booklet entitled "Democracy at Work in School Shops." It was prepared by J. Herbert Kissinger, director of industrial education at Reading.

It tells in words and pictures just how democracy and industrial education can be made to dovetail together. It is good reading for anyone interested in industrial arts and vocational education.

Probably if you write for a copy, Thomas H. Ford, the superintendent of schools at Reading, may be able to send you one.

♦ The State Education Department, Albany, N. Y., announced recently the establishment of a division of industrial and technical education, with the Bureau of Trade and Technical Education, the Bureau of Industrial Arts Education, and the Bureau of Occupational Extension and Industrial Services.

Frank P. Johnson will be acting director of the new division. He has been chief of a bureau with a similar title.

William N. Fenninger has been made acting head of the Trade and Educational Bureau, and Dr. Roy G. Fales is acting chief of the Bureau of Industrial Arts Education.

The position of chief of the Bureau of Occupational Extension and Industrial Services will be filled from a civil service list to be established later.

The division and the bureaus are under the administrative direction of Dr. Arthur K. Getman, assistant commissioner for vocational education.

♦ Practical information on the application of motors and controls to specific farm operations is contained in a new 15-page booklet, "How to Apply Motors and Controls to Farm Jobs."

For a copy of Booklet 4155, write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

♦ Westinghouse sound motion pictures and slide films for education and entertainment programs are described in a new 46-page booklet announced by the Westinghouse Electric Corporation.

For a copy of this booklet (B-4273), write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

♦ A résumé of the work of the *College Librarian* and career possibilities in that field is the subject of a new Occupational Abstract written by William J. Meeneghan and Muriel D. Lickel. This leaflet is available for 50 cents per copy; 35 cents each for ten or more, cash with order, from Occupational Index, Inc., 51 West 4th St., New York 3, N. Y.

♦ Nearly half a million World War II veterans who did not complete grade school before the war

(Continued on page 14A)

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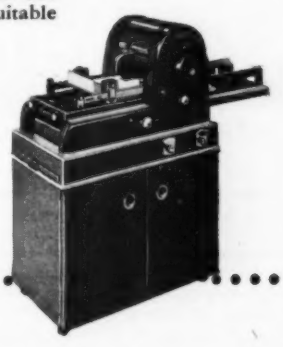

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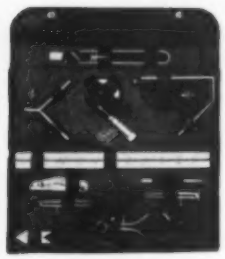

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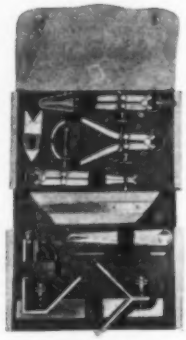
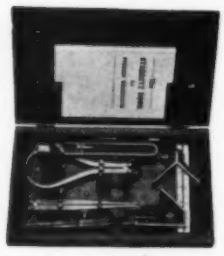
A more complete set for students and apprentices. Contains a 1" micrometer, 12" combination square with center head, center gage, center punch, 6" flexible steel rule in case, 4" divider, 4" inside caliper, 4" outside caliper and 4" hermaphrodite caliper. Simulated leather folding case.



SET NO. 900

The basic tools at minimum cost. Contains 6" combination square complete, 6" flexible steel rule, center gage, center punch, 4" divider, 4" inside caliper, 4" outside caliper and 4" hermaphrodite caliper. Simulated leather folding case.



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NEWS NOTES

(Continued from page 12A)

have been given the chance to further their education through the G.I. Bill.

The figure is based on a V–A sampling which disclosed that 8 per cent of the 6,000,000 veterans who so far have taken G.I. Bill training did not have an eighth-grade education at the time they started their G.I. courses.

The sampling was made as of June 1, 1949.

♦ Idaho reports 336 students taking pre-apprentice trade training courses in high schools of the state.

They are enrolled in 15 auto-mechanics classes, two printing classes, six machinist classes, and one radio class.

♦ New uses of lath and plaster to lower the cost of homes and other on-the-site construction were reported today by Armour Research Foundation of Illinois Institute of Technology, University of Illinois, Champaign, Ill.

Foundation scientists made exhaustive tests of different types of plaster mixes and wall and ceiling construction for the U. S. Department of Commerce. Among their conclusions were:

1. In the past many joists have been stiffer and more costly than necessary because of a 120-year-old stress formula not applicable to modern materials or methods.

2. Walls can be made stronger and more resistant to plaster cracks by merely changing the position of lath for better reinforcement where greater stresses occur.

3. Plaster strength increases when the proportion of sand included decreases.

4. Proper plaster thickness and application aids resistance to cracking.

♦ Two bulletins, "Vocational Rehabilitation and Education Information Bulletin," and "Federal Benefits Available to Veterans and Their Dependents," are now available. Both are obtainable from the Veterans Administration, Washington 25, D. C.

♦ "Shop Safety Education," a new book prepared under the direction of J. James Jehring, professor of the New York State School of Industrial and Labor Relations, and Frederick Theurer, supervisor of vocational education, Buffalo, N. Y., has just been published. The book may be ordered from the State Education Department, Bureau of Vocational Curriculum Development and Industrial Teacher Training, Albany 1, N. Y.

♦ Five intensive one-week courses for industrial finishers are included in the DeVilbiss School of Spray Painting curriculum for the first half of 1950. Maintained as a service to all users of DeVilbiss equipment, these tuition-free courses include comprehensive instruction on all spray painting techniques and the function and care of spray equipment.

Classes lasting one week each will begin on January 23, March 27, April 17, May 8, and June 19, with all courses covering the same subject matter. For further information and application blanks, write for Forms F-224 and INS-753-A to The DeVilbiss Co., 300 Phillips Ave., Toledo 1, Ohio.

♦ The board of education, Lincoln, Neb., approved the request of the vocational education department to allow 20 boys in the trade preparatory class to build a horse barn for the state fair grounds.

The boys will work three hours each afternoon. The fair board will furnish all materials for the 32 by 110-ft. structure. Written permission for the boys to take part will be secured from parents.

♦ The State University at Bowling Green, Ohio, reports a 1.43 per cent increase over last year in the number of graduate students. The total of all students on the campus is 4684, or 159 more than a year ago.

The Graduate School enrolled 165 in comparison with 115 last year, Registrar John W. Bunn reported.

The men outnumbered the women by 2888 to 1796.

Enrollment is up in the freshman and senior classes and in the College of Education. There are 114 part-time students, 229 transfers from other colleges, 3766 students from Ohio, 861 from other states, and 57 from other countries. The freshman class numbers 1544; sophomore, 1019; junior, 950; and senior, 971.

The College of Education has 1966; Liberal Arts, 1298; and Business Administration, 1220.

♦ Instructors of architectural drafting and carpentry will find many helpful suggestions and much valuable information in a new booklet, *Preparation and Revision of Building Codes*, recently published by the National Bureau of Standards and now available from the U. S. Government Printing Office.

Building Materials and Structures Report BMS 116, *Preparation and Revision of Building Codes*, by George N. Thompson, 17 large double column pages, 15 cents, available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

♦ National Carbide Corporation has announced the publication of a 16-page booklet entitled "The Miracle of Calcium Carbide."

The booklet traces the history of calcium carbide from the time of its discovery as a commercial possibility over 50 years ago, through the developments of manufacture and the current and potential usage of commercial calcium carbide, acetylene gas, and calcium hydrate residue.

Copies of this new booklet are available on request by writing National Carbide Corporation,

(Continued on next page)

NEWS NOTES

(Continued from previous page)

Room 1656, 60 East 42nd Street, New York 17, N. Y.

♦ The industrial-arts portion of the new practical arts building, Ball State Teachers College, Muncie, Ind., is showing considerable progress. The building is enclosed, plastering has been completed, acousticized ceilings are up, wooden floors are being laid, and in a very short time the metal partitions with glass windows will be installed.

Equipment and cabinetwork contracts have been awarded and some equipment has been received. There is every indication that cabinetwork will be ready for installation when floors, partitions, and finishing are completed.

♦ Seventy-five seniors of Ball State Teachers College were either placed in industry or teaching jobs in the spring and summer of 1949. Out of this group two were placed in college teaching jobs. Three are in school in the services, two went to industry, and eleven are in the elementary field. One student was placed in California, two in Florida, two in Michigan, and one in Ohio. Three senior students have gone on with their master's work.

♦ In order to explain the many advantages of aluminum extrusions, the Reynolds Metals Co., 2500 So. Third St., Louisville, Ky., has issued a two-color brochure covering the various applications, and how a single extrusion will frequently eliminate the assembly of two or more parts.

A description of how the shapes are produced is given, and how special shapes to fit particular needs may be designed.

♦ A "Directory of Secondary Schools in the United States," just issued by the Federal Security Agency, lists public and private schools in every state, the District of Columbia, and the Territories, and furnishes information on each school's accreditation status, number of students and graduates, number of teachers, and other facts.

Copies are available only from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., as Office of Education Circular No. 250. The price of a single copy (496 pages) is $1.50.

♦ A new 16-page booklet listing forestry materials available without charge for classroom use is now being distributed to schools in 48 states.

The bibliography, "Forests, Their Use and Conservation," deals with the importance of trees, the nation's only natural renewable resource. Booklets, wall displays, and a motion picture, "Trees for Tomorrow," described in the bibliography, present facts intended to create a better understanding of forestry problems.

Copies of the bibliography may be obtained free of charge from the American Forest Products Industries, Inc., 1319 — 18th St., N.W., Washington 6, D. C.

♦ In recognition of her long-continued contribution to the upbuilding of the state, Dr. Ella J. Rose, St. Paul, Minn., as president of the Minnesota Vocational Association has been presented with The Minneapolis Star and Tribune Award for Leadership in Minnesota.

The presentation was made at the third annual convention of the Minnesota Vocational Association in Minneapolis on October 20, 1949.

The Minneapolis Star and Tribune plan a series of similar awards to leaders of state, business, and trade associations, holding conventions in Minneapolis.

♦ A new 47-page booklet, "Electrical Ideas for Better Farming," containing information for putting electricity to work on the farm has been prepared by the School Service Department, Westinghouse Electric Corporation.

The booklet offers specific suggestions as to how electricity can be applied to dairy farming; to the raising of sheep, beef cattle, poultry, and hogs; and to the handling and care of crops, so that faster and more economical methods of farming can be worked out. Better lighting methods, also, are covered, and a brief discussion on wiring materials and methods is included. Copies of the booklet for classroom distribution can be obtained, free of charge, from the School Service Department, Westinghouse Electric Corporation, 306 Fourth Ave., Box 1017, Pittsburgh 30, Pa.

♦ A pamphlet entitled "The Significance of Source Material in the School Curriculum," by Dr. John Guy Fowlkes, presents an important analysis of the compelling need for source materials to supplement and vitalize textbook teaching. The pamphlet is available without cost from Educators Progress Service, Randolph, Wis.

♦ A 24-page catalogue describing 14 sound motion pictures for classroom use has been released by the School Service Department of the Westinghouse Electric Corporation. These films can be borrowed free of charge except for transportation costs.

The motion pictures described and illustrated in the catalog cover subjects in the field of jet propulsion, electricity, electronics, radio, nutrition, salesmanship, social science, and industrial arts. The catalog also describes various teaching aids which are available in connection with the films.

Teachers can secure copies of the Motion Picture Catalogue (B-4444) by writing to the School Service Department, Westinghouse Electric Corporation, 306 Fourth Avenue, Box 1017, Pittsburgh 30, Pa.

♦ A descriptive booklet showing how Talon, Inc., manufacturers of slide fasteners, train apprentices for craftsmanship in the tool and die

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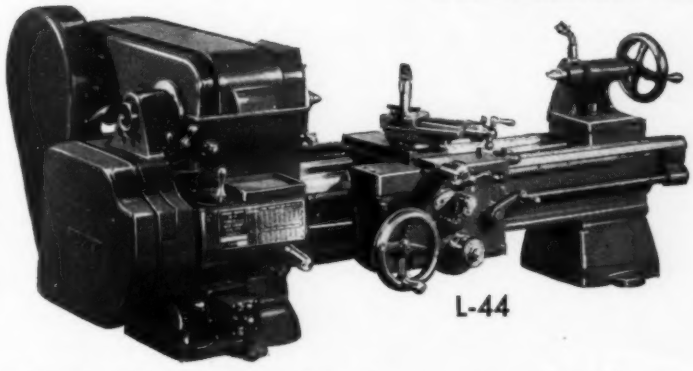

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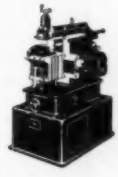
Write for Sheldon Machine Tool and Accessory Catalog or send 75¢ for Sheldon's simplified beginners text, "Care and Operation of the Lathes."



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NEWS NOTES

(Continued from previous page)

making trade, is described in a 4½-page article reprinted from Iron Age.

Copies of this reprint may be obtained free of charge by writing to the Bureau of Apprenticeship, U. S. Department of Labor, Washington 25, D. C. When requesting copies, please mention the publication in which you read the announcement.

♦ Rider Manual Volume 20, the latest volume in the series of manufacturers' authorized data, is announced as a January, 1950, publication by John F. Rider Publisher, Inc., 480 Canal Street, New York 13, N. Y.

Manufacturers' servicing data on AM, FM, auto receivers, and record changers will give complete coverage as of the publication date. A "How it Works" book with cumulative index for Volumes 16 through 20 is another prominent feature.

♦ The National Safety Council, 20 N. Wacker Drive, Chicago 6, Ill., offers help to school administrators and teachers in organizing an effective safety program.

There is no charge for consultation. The council sells school publications at cost, and industrial and motor transportation safety materials are sold to schools at the same price charged to council members.

For further information write to the address given at the head of this news item, asking for Service Guide 2-3.

♦ The following 1949 "Occupational Briefs" have been made available by Science Research Associates, Inc., 228 S. Wabash Ave., Chicago 4, Ill.

No. 51. Teachers of Exceptional Children; No. 52. Public Administration Workers; No. 53. Vocational Rehabilitation Workers; No. 54. Personnel Workers; No. 55. Brick and Stone Masons. No. 56. Carpenters; No. 57. Building Maintenance Workers; No. 58. Architects; No. 59. Interior Decorators; No. 60. Nurserymen and Landscapers; No. 62. Occupational Therapists; No. 63. Medical Technologists; No. 64. Home Economists; No. 65. Teachers; No. 66. College Professors; No. 67. Auto Sales and Service Workers.

For further information write to Alice H. Frankel, at the address given at the head of this news item.

New Publications

Text in Patternmaking

By Alexander V. Hanel. Cloth, 314 pp., 6¼ by 9¼ in., illus., $2.96. The Bruce Publishing Company, 540 North Milwaukee St., Milwaukee 1, Wis.

A fine patternmaking text for students in the junior and senior high schools, and in full-time and part-time vocational schools, trade schools, and adult evening classes.

The first 13 chapters concern themselves with operations and processes while the rest of the book concerns itself with job assignments for 8 semesters.

The book also contains a glossary of patternmaking and molding terms.

The book is freely illustrated with line cuts and half tones.

General Drafting

By Verne C. Fryklund and Frank Roy Kepler. Paper cover, 166 pp., 7¾ by 10¼ in., illus., $1. McKnight & McKnight Publishing Co., Bloomington, Ill.

A revised and enlarged edition of a text on drafting consisting of 74 learning and doing units.

(Continued on next page)

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Everyone needs a course that will . . .

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- **interpret fundamental industrial technology for students.**
- **explore the student's aptitude for drafting.**
- **provide valuable Life Adjustment material.**

Available January 1st. A complete work-textbook to meet this need.

Applied Drawing and Sketching

By

Joseph W. Fleming, *Director of Industrial Arts and Vocational Education, Pittsburgh.*

Dewey F. Barich, *Head of Industrial Arts Department, Kent State University.*

L. C. Smith, *Assistant Managing Editor, American Technical Society.*

The salient feature of this new book is its realistic application to the needs of everyday life. Every class is filled with information of vital importance to the student — even though he may not plan to continue with other drafting courses.

List price $2.00

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NEW PUBLICATIONS

(Continued from previous page)

The book contains directions for making drawings for a number of industrial activity areas, and also furnishes considerable related material.

It contains a large number of well-made drawings which show the student how to make the drawings needed to solve his own problems.

Test questions are provided at the end of each unit.

General Leathercraft

By Raymond Cherry. Paper cover, 127 pp., 7¾ by 10¼ in., illus., $1.50 McKnight & McKnight Publishing Co., Bloomington, Ill.

This is the third edition of this excellent text for students and homecrafters in the interesting subject of leatherwork.

The book is divided into four parts. The first is devoted to related information, the second to fundamental operations, the third to projects, and the fourth to designs.

This new edition contains 16 additional pages on lacing and carving.

Foundations of Method for Secondary Schools

By I. N. Thut and J. Raymond Gerberich. Cloth, 493 pp., 6¼ by 9¼ in., $4. McGraw-Hill Book Co. Inc., New York City.

A text for general secondary school methods courses.

Part I of the book discusses the purpose of secondary education, and the concept of pupil needs, and what the implications for method they represent.

Part II discusses method based on daily assignments, and on subject matter and on experience units.

Part III discusses the core curriculum, pupil appraisal, discipline, audio-visual aids, and the professional growth of the teacher, and his function as a counselor.

Study Questions to Accompany Electric Motor Repair

By Robert Rosenberg. Paper, 47 pp., 8½ by 11 in., 25 cents. Technical Division, Murray Hill Books, Inc., New York and Toronto.

This book contains questions for each chapter in Electric Motor Repair, arranged in sequence with the information found in the book.

Home Repairs Made Easy

By Lee Frankl. Cloth, 439 pp., 8½ by 11 in., illus., $6.95. Nelson Doubleday, Inc., Garden City, N. Y.

This book contains over 2000 illustrations which, with brief directions, show how to plan and equip the home workshop; how houses are constructed; how to make and repair cabinets, furniture, floors, stairs, windows, doors, the roof, etc.

Concrete work, plastering and stucco work, masonry, painting, and how to repair plumbing, and the heating and electrical systems.

The book also contains a glossary of building terms.

Pattern Without Pain

By Allen W. Seaby. Cloth, vi–120 pp., 5¾ by 8¾ in., $3.50. B. T. Batsford, Ltd., New York 22, N. Y.

The author of this book on pattern design insists that the principles of the subject and skill in developing original patterns can be acquired by careful study and application, but that neither the study nor the exercises need be painful. On the contrary the whole subject is intensely interesting and challenging. The work here presented begins with the simplest elements, describes the processes of making and combining units with shears and brush, applies single patterns in the round, describes methods of introducing contrast in shape and color. Separate

(Continued on page 24A)

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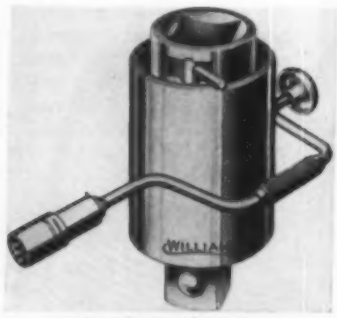
Shop Equipment News

NEW PRODUCTS — PUBLICATIONS

RATCHET ADAPTER TO "SUPERSOCKET" LINE

J. H. Williams and Co., 400 Vulcan St., Buffalo 7, N. Y., announce a compactly designed ratchet adapter, which can be used in extremely limited quarters. Its use with any of the ¼-in. square drive handles or attachments such as speeders, T handles, flex handles, etc., increases the versatility of the driver selected by converting it to a ratchet tool.



Ratchet adapter

Williams ratchet adapter is made from selected alloy steel and is fully finished in bright chrome plate. Length is $2^{9}/_{16}$ in., diameter, 1¼ in. Ratchet gear has 30 teeth; shift lever reverses action instantly.

This ratchet adapter appears in Williams A-50 Booklet with a complete line of "Supersockets" and "Superrenches." Ask your dealer for a copy or write to J. H. Williams & Co.

For brief reference use IAVE — 0101.

HIGGINS PEN CLEANER

"Pen Cleaner" is the latest product issued by Higgins Ink Co. Inc., of Brooklyn, N. Y. The new item is designed to remove dried waterproof drawing ink from nonabsorbent surfaces. It is *not*, however, an ink "remover" for use on tracing cloth and paper.

Higgins Pen Cleaner fills a long felt need for a speedy cleansing agent for artists' and draftsmen's pens, brushes, and instruments. The new pen cleaner is harmless to instruments, brushes, hands, and clothing, and is noninflammable. Higgins pen cleaner is available in ¾-oz. bottles with dropper stopper, 2½-oz. wide mouth jars with screw cap, and in 18-oz. bottles.

For brief reference use IAVE — 0102.

ANGLE HEAD WRENCHES

Snap-on Tools Corp., Kenosha, Wis., announces the addition of a series of angle head wrenches, designed for close quarter work. Forged from alloy, high carbon steel, they are specially heat treated and tempered to give them ruggedness and toughness.

The heads of these wrenches are set, one at 30 deg., and the other at 60 deg. Both heads on each wrench are the same size; hence, they may be switched to permit turning nuts in narrow swing areas. Thin heads — only ¼ in. on the largest size — means clearance problems are practically eliminated.

Other features include well-rounded handle edges; pear-shaped heads to give extra strength

(Continued on page 20A)

Higgins pen cleaner

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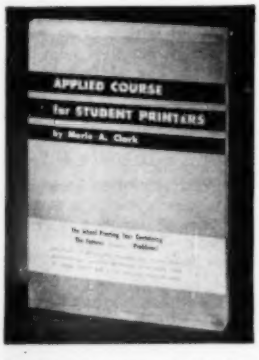

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by Merle A. Clark

Considers every type of job in composition and presswork — from learning the job case and distribution up to making practical tabular forms. Frequent check points are inserted in the procedure to enable the instructor to follow the pupil's progress through the more difficult operations. Each pupil progresses as an individual. Material has been developed by the author in his own shop during a period of twenty years.

A unique feature is the information sheets which the student folds and trims into complete booklets, each with title page. A practical text, it emphasizes newspaper composition, tickets, advertising, etc. No "busy-work" material. Each activity has a clearly defined purpose. Sufficient material given for 2½ to 3 years course. $2.40

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Step-by-step procedures from rough stock to finished project. Instructions for proper use of woodwork machines — circular saw, band saw, drill press, lathe, etc. $2.60

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SHOP EQUIPMENT NEWS

(Continued from page 18A)

Angle head wrenches

at the point of greatest strain; draw-broached, close-fitting wrench openings; and a durable, rust-proof double plated finish of nickel and chrome over the entire tool.

Four wrench sizes are available with 7/16-, 1/2-, 9/16-, and 5/8-in. openings.

For brief reference use IAVE — 0103.

CATALOG OF RED DEVIL TOOLS

The new No. 20 Catalog of Red Devil tools, machines, and specialties just released by Red Devil Tools, Irvington 11, N. J., describes in seven sectional divisions glaziers' tools, painters tools and cutlery, wood and other hand scrapers, paint conditioners, auto specialties, floor polishers, sanders and edgers, and hardware specialties and machines.

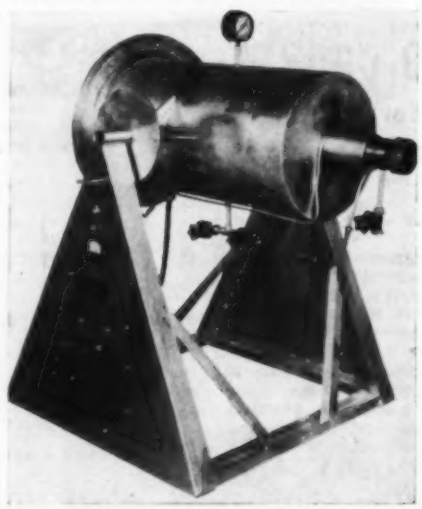
There also are the "How to Use" pages, the merchandizing pages, and valuable operation data sprinkled throughout this 84-page book.

A copy will be sent to any reader of this magazine making a request on his school's letterhead.

For brief reference use IAVE — 0104.

HIGH TEMPERATURE PERECO FURNACE

High-temperature operation up to 3500° F., under a neutral or reducing atmosphere pure enough to sinter chromium without oxidation, is featured by the Model MO-224 Molybdenum-Vacuum Electric Furnace, announced by Pereny Equipment Company, 893 Chambers Road, Columbus 12, Ohio. Recommended average operating temperature is approximately 3300° F. with



High temperature Pereco furnace

the maximum peak of 3500° F. for short cycles. The steel case of this unit is designed to maintain a vacuum of 30 in. of mercury. The furnace can be positioned either horizontally or vertically.

This is a dual-tube Pereco Furnace so constructed that the inner, or primary, tube containing the molybdenum element may be removed readily without disturbing the furnace proper. The element is designed to compensate for heat gradient at the tube ends.

Working area of the furnace is 2 in. i.d. by 28 in. long, with an 18-in. controlled temperature length. It has one open end with a 10-in. vestibule or sight tube. It can be supplied with both ends open when required. The sight tube and face of the furnace are water cooled. A Pyrex or quartz sight lens is provided and may be removed or replaced quickly. This feature permits the mounting of thermocouples or other equipment when such change is desirable.

The Pereco MO-224 Electric Furnace has connections for neutral or reducing atmospheres, vacuum, and water. Power input required is 6 k.w., 220 volts, 60-cycle, single phase.

For brief reference use IAVE — 0105.

METALLIC PAINTS FOR GLASS DECORATION

It is possible now for craft workers using Dek-All paints, manufactured by The American Crayon Co., Sandusky, Ohio, to augment their color palettes with gold and silver.

The gold and silver powders are obtainable at any paint or art store. When mixed with Prang Dek-All Trans-Mix, they provide an excellent medium for painting on glassware, china, pottery, or metal without firing.

For added scuff and washing resistance, an extra coating of Trans-Mix can be flowed over the gold and silver application, after which they may be dried in any home oven according to directions for the use of Dek-All.

The Prang Dek-All Trans-Mix is included in all Dek-All Kits, which are carried by paint and art stores, where gold and silver powders may also be obtained.

For brief reference use IAVE — 0106.

NEW RESEARCH DEVELOPMENT BY CINCINNATI MILLING

The Cincinnati Milling Machine Company described an important research development—a new grinding wheel—in No. 3 of Volume 6 of

(Continued on page 23A)

OFF PRESS SOON!

1. GENERAL MECHANICAL DRAWING

by William Jervis, Central High School, Scranton, Pennsylvania

Here is a book that offers a new psychological approach to Mechanical Drawing rather than the logical approach that has been used through the years. In recent years educators have questioned the value of Mechanical Drawing which trains students only in skills toward the engineering profession, but does not train pupils in skills applicable to every day living. The author presents hundreds of interesting problems of practical value in such manner that pupils can readily assimilate the information.

316 pages, 6 x 9, 369 illustrations, cloth, $2.75

2. AUTOMOBILE BODY REBUILDING AND REFINISHING

by William K. Toboldt, Editor Motor Service Magazine, Chicago, Illinois

This book presents a comprehensive treatise of the rebuilding of automobile bodies that have been damaged by collision or from other causes, and the refinishing or painting of the cars so as to restore their original appearance. Thorough basic instruction on welding, soldering, and sheet-metal work is included. The book is profusely illustrated, and will be valuable as a textbook in vocational schools, or for reference purposes.

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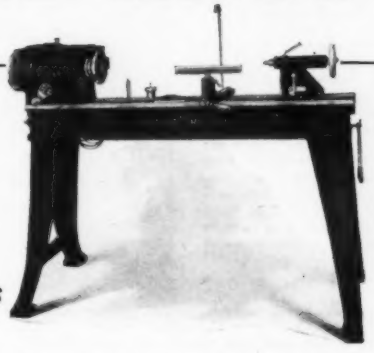

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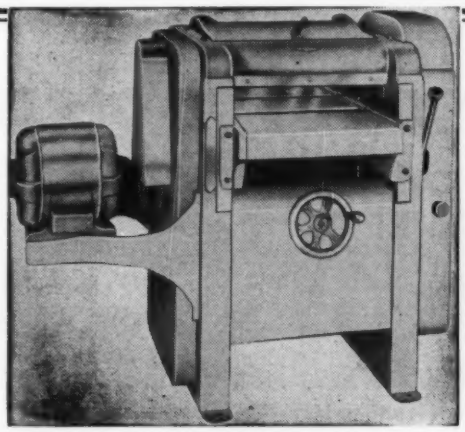

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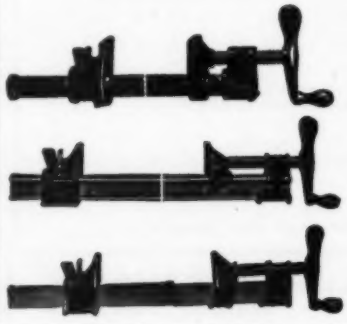

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SHOP EQUIPMENT NEWS

(Continued from page 20A)

their technical magazine, "Report from Cincinnati Milling."

This basic research, applied to various types of single point tools and milling cutters, discloses much useful information which can be used for the improvement of the cutting action of the abrasive grains in grinding wheels.

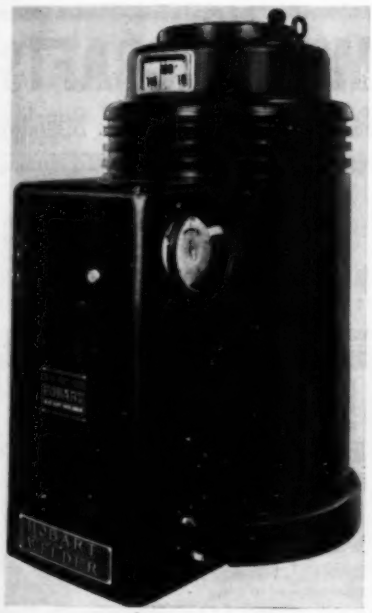
The company's research engineers' efforts to improve the performance of abrasive grains as cutting tools in the grinding process have included an exhaustive study of the individual grains and their characteristics, together with the many variable factors which affect the wheels themselves. They also have studied such factors as pressure, friction and heat, which are cumulative in their effect. Performance records established under everyday operating conditions on all types and sizes of grinding jobs have indicated that the new wheels have characteristics for improved performance.

For brief reference use IAVE — 0107.

INERT-GAS SHIELDED WELDER WITH SUPPLEMENTARY LOW HEAT CONTROL

The new Hobart Model TIH-200-S a.c. welder for inert gas welding has supplementary low heat control.

Like the larger TIH models, Model TIH-200-S is so equipped that it can be used either as an ordinary transformer type welder, or with the special features switched on for inert-gas shielded welding. In addition, it is equipped for exceptionally fine results in work that calls for extremely low current values.



Inert-gas shielded welder

The low heat control is accomplished by means of a secondary reactor built in and controlled by the hand wheel located on the side of the case. It can be switched on or off at the operator's will. When on, it makes possible effective welding current as low as 7 amperes.

For further information, write Hobart Brothers Co., Troy, Ohio.

For brief reference use IAVE — 0108.

NEW LATHE ATTACHMENT CATALOG

More than 130 different attachments and accessories for South Bend Lathes and Drill Presses are illustrated and priced in the new 28-page Catalog 77-U. Many new items are catalogued, including some recently developed attachments not previously announced. Although these attachments and accessories are designed primarily for use on South Bend Machine Tools, many of them can be easily adapted to other makes.

A copy of Attachment and Accessory Catalog No. 77-U will be mailed on request, from South Bend Lathe Works, 178 East Madison Street, South Bend 22, Ind.

For brief reference use IAVE — 0109.

PLANT MODERNIZATION

The Yates-American Machine Company of Beloit, Wis., has announced the completion of an extensive plant modernization program. An important part of this program was a complete change in plant layout and the improvement of plant production methods. The program also included the installation of many new production machines for the machine shop, the installation of new heat-treating equipment in the head and knife department and mechanization of the foundry.

The firm is glad to announce that Yates-American machines are available again for school shops. The development of new machines and the redesign of existing models has always been given foremost consideration by the firm, and this policy will continue to be emphasized in the future.

THE DUMORE HOBBY TOOL

The Hobby Tool, a popular priced, lightweight, powerful hand grinder, is announced by The Dumore Company, Racine, Wis.

The 1/40 h.p. hobby tool runs on 115 v., a.c. or d.c., at 28,000 r.p.m. It is an ideal hand grinder

(Continued on next page)

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Birch	Elm	Maple - Soft	Rosewood	
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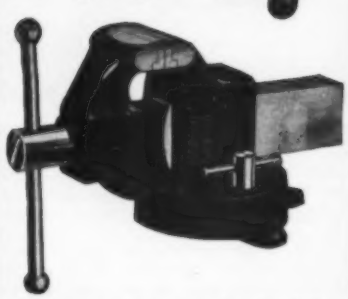

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SHOP EQUIPMENT NEWS

(Continued from previous page)

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The Hobby Tool is available in 2 kits — the DeLuxe in a steel box with 50 accessories, and the Standard in an attractive carton with two accessories.

For brief reference use IAVE — 0110.

NEW PUBLICATIONS

(Continued from page 17A)

chapters take up interlacing of patterns, developing repeats, combining patterns with patterns in large areas and borders, working out borders, and applying patterns to the crafts and to industrial design. Sources of design in nature, in geometric figures, and in historic areas are explored. Color as an element is not overlooked. The book is practical and suggestive.

Home Mechanics

By J. C. Woodin. Paper, 104 pp., 7¾ by 10¼ in., illus., $1.25. McKnight & McKnight Publishing Co., Bloomington, Ill.

Twenty-nine instructional units for use in industrial-arts classes which will give both boys and girls some skill in making repairs about the home.

Besides showing the student how to use the common woodworking tools, the book discusses such subjects as regluing furniture; painting, enameling, and varnishing; upholstering; the care and upkeep of floors and floor coverings, plaster patching, repairing windows and screens; locks and hinges; window shades; care and upkeep of electrical gadgets; and the gas stove, hot water system, and plumbing.

Group Guidance: Principles, Techniques, and Evaluation

By Robert Hoppock. Cloth, 393 pp., 6⅛ by 9¼ in., $3.75. McGraw-Hill Book Co., New York City.

A comprehensive book on group guidance which will be helpful to beginning high school counselors. It represents the experimentation of the author when he was teaching group guidance courses.

In it the author establishes the place for group guidance, what is to be included in it,

(Continued on page 26A)

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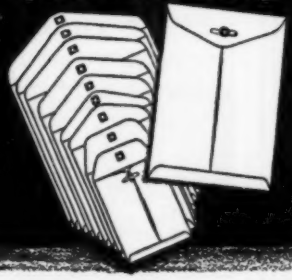

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NEW PUBLICATIONS

(Continued from page 24A)

and who should teach it. He also discusses techniques to be followed and how to evaluate the content and methods employed in group guidance work by others engaged in this type of work.

Ohio High School Standards, A Guide for Industrial Arts Shop Planning

By P. S. Waldeck, supervisor of industrial arts, Office of Superintendent of Public Instruction, Columbus, Ohio.

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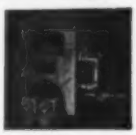

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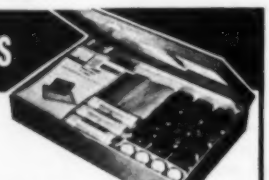

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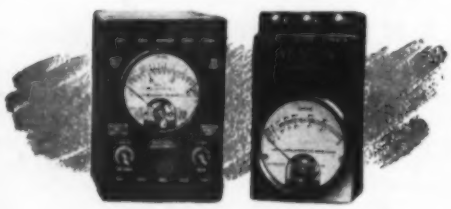

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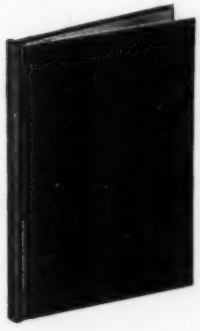

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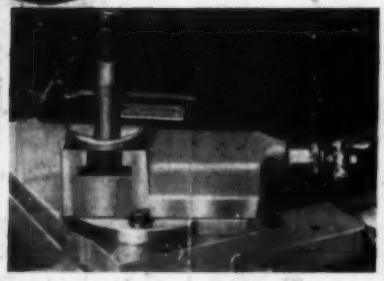
THE WIPERS do a good job of keeping ordinary turnings out from under the carriage. But when you work with cast iron, you should remove the wipers occasionally and clean them in kerosene to rinse out dirt and grit.

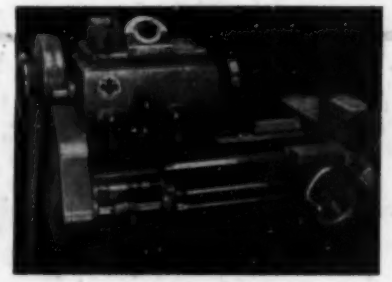


WHEN YOU PLACE A TOOL in the tool post, check to be sure there are no chips between the collar and the compound rest, or between the collar and wedge. Your tool can't get a firm rest in a dirty tool post.

DON'T MOVE THE TAILSTOCK without carefully wiping off the bedways first. Chips on the ways will throw the tailstock out of alignment and ruin its accuracy. Also keep tailstock spindle clean.

BEFORE REPLACING CENTER, wipe out the hole and clean the tapered part of the center. When using drills, chucks or reamers, be sure they are tight in the taper hole. If there is dirt between the two, the tool will revolve and score the taper hole.

PROTECTIVE DESIGN MAKES REGAL THE PERFECT TRAINING LATHE



CAREFUL DESIGNING of the Regal insures ample protection against chips. Covers over moving parts keep chips where they belong. Shear wipers brush chips off the ways, eliminate danger of scoring carriage or bed. Openings between cross girths in the bed allow chips to fall away from work. A chip pan, available as extra equipment for new Regals, keeps chips off the floor and eliminates an under-foot hazard.

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